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MÉNIÈRE'S DISEASE

ADDENDA TO MEDICAL THERAPY

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Prompted by visionary speculation and the hope that a theory might be reduced to facts, Furstenberg, Lashmet and Lathrop [1] in 1934 undertook water balance studies on patients with Ménière's disease. The speculation suggested the possibility of cerebral hydration or waterlogging as the responsible etiologic factor in Ménière's disease, and the theory furnished the concept that the removal of body fluids, dehydration, might eliminate the offending influence and restore the patient to normal equilibrium. The theory proved to be a tenuous one, but its investigation led to an interesting discovery. It was observed, for example, that the quantity of water in the patient's tissues at any given time bore no relation to Ménière's disease but that sodium used in hydrating the patient appeared to initiate the characteristic vertiginous attacks of this disorder. The conclusion reached from these studies was that the tissues responsible for Ménière's disease were sensitized to or had an increased avidity for the sodium ion. Thus, the treatment appeared to be clearly defined: Reduce the intake of this element to the minimum by prescribing a sodium-free diet, and insure its maximum elimination in excretory fluids by the administration of the acid-forming salt ammonium chloride.

More than 150 patients suffering from Ménière's disease have been treated in our clinic by this method. The results have been so uniformly satisfactory that we should like to offer a statistical compilation derived

Read at the Sectional Meeting of the American College of Surgeons, in Pittsburgh, March 17, 1941.

1. Furstenberg, A. C.; Lashmet, F. H., and Lathrop, F. D.: Ménière's Symptom Complex: Medical Treatment, Ann. Otol., Rhin. & Laryng. **43**:1035-1047 (Dec.) 1934.

from a careful study of 35 patients who have received the therapy first advocated by Furstenberg, Lashmet and Lathrop in 1934. Cogent conclusions are not in evidence in this study, but the clinical results are gratifying enough to justify our continued enthusiasm and interest in this method of treatment.

Unhappily, the precise etiologic factors in Ménière's disease have never been satisfactorily determined. Nor has the location or the character of the lesion responsible for this entity been identified, although Crowe [2] and Hallpike and Cairns [3] believe that the pathologic changes occur within the internal ear. By inferential deductions, Crowe [2] assumes that both the vestibule and the cochlea are involved in the pathologic processes and that either chemical or pressure changes of the endolymph and possibly the perilymph which stimulate the vestibular end organs are responsible for the sudden violent attacks of vertigo. With this view we are heartily in accord. One may find proof of this assumption in the symptom complex of Ménière's disease, which is precisely that induced by stimulation of the otic labyrinth. The vertigo produced by douching the ear with cold water is identical with that observed in a typical attack of Ménière's disease. Some observers have ventured the opinion that in isolated instances the symptoms were due to vascular changes or abnormalities about the acoustic nerve, but this seems somewhat doubtful when one notes in the records that the facial nerve was singularly free from involvement. It is difficult to conceive of a lesion pressing on the acoustic nerve that would not exert an influence on its most intimate neighbor, the seventh nerve. Moreover, we have made serial pathologic sections of acoustic nerves taken from patients who were operated on in the early years of our experience, and they have been found free from pathologic alterations. Likewise, the singular absence of other neurologic findings in Ménière's disease would contravene any argument that the lesion might be found in the medulla or the pons. The compact relationship of the basal nuclei in the brain stem would obviously favor other neurologic manifestations if a lesion thus situated were of large enough proportions to encroach on both the vestibular and the cochlear fibers. It is a striking observation that patients with Ménière's disease are peculiarly free from signs or symptoms referable to the other cranial nerves. The only pathologic locale that is reconcilable to the clinical findings versus the vertiginous attacks comparable to those produced by stimulation of the otic labyrinth, the evanescent character of the symptoms, the absence of involvement of the facial nerve and freedom from any disturbances of the other cranial nerves,

2. Crowe, S. J.: Ménière's Disease, Medicine **17**:1-36 (Feb.) 1938.

3. Hallpike, C. S., and Cairns, H.: Observations on the Pathology of Ménière's Syndrome, Proc. Roy. Soc. Med. **31**:1317-1336 (Sept.) 1938.

is a lesion within the otic labyrinth. As Crowe [2] has pointed out, this may be either mechanical pressure or some chemical alteration in the endolymph, and the latter would rationalize admirably well the theories posed by us.

We have been unable to substantiate by laboratory experimentation our original premise that the sodium ion is the offending influence in the production of the vertiginous attacks of Ménière's disease; neither have we been able to disprove this theory. If, as Crowe [2] and Hallpike and Cairns [3] believe, chemical or pressure changes in the endolymphatic system of the internal ear are responsible for the attacks of vertigo, we naturally rationalize our hypothesis on the basis of retention of sodium in the labyrinthine cells which exhibit an increased affinity for this particular ion. Talbott and co-workers [4] have attempted to prove this point by determining the sodium content of the blood in patients with Ménière's disease, but they have not met with encouraging results. It might be assumed that if there is a retention of sodium in the otic labyrinth, this would be reflected in the sodium content of the blood. Such an observation has not yet been made; the sodium content of the blood is not elevated in Ménière's disease. Yet this finding is not inconsistent or in disagreement with the physiologic behavior of body fluids and their contents. The situation is not incongruous. A somewhat analogous condition may be found in Addison's disease. In the very severe forms of this disorder, the sodium level of the blood may be found within normal limits, yet the cortex of the adrenal gland, which is said to control the metabolism of sodium, is extensively damaged. With this analogy in mind, representing as it does a striking example of physiologic incongruity, it is reasonable to assume that the slight retention of sodium which occurs perhaps in the labyrinth of patients suffering from Ménière's disease would not necessarily be associated with a similar retention of this ion in the blood.

We have been successful in obtaining return visits from 35 patients who came to us with the typical signs and symptoms of Ménière's disease. Six of these patients had been subjected to our treatment within the past year. Nine had been treated from one to two years ago, and the remainder (20 patients) had experienced a lapse of three to seven years since our therapeutic procedure had been used. The average duration of treatment in this group was thirty-two months, the minimum being three months and the maximum seven years. Each patient had a history of repeated intense attacks of vertigo associated with nerve deafness, frequently bilateral but more profound in one ear, persistent

4. Talbott, J. H.; Brown, M. R.; Coombs, F. S., and Consolazio, W. V.: Electrolyte Balance of the Blood in Ménière's Disease, Proc. Soc. Exper. Biol. & Med. **38**:421-422 (April) 1938.

tinnitus, sometimes aggravated before and during the attacks, nausea and vomiting in the severe episodes and occasionally the discovery of a spontaneous nystagmus while in the throes of a vertiginous seizure. In all of these cases we were careful to rule out by clinical and laboratory studies any intracranial organic disease, as well as the remotest possibility of the presence of psychic elements. All of the patients were subjected to caloric stimulation of the otic labyrinths, audiometric tests, roentgen examinations of the skull with particular reference to the internal auditory meatuses, ophthalmologic studies and careful physical and neurologic examinations.

These persons were from 16 to 67 years of age, but most of them were adults in the fifth and sixth decades of life (average age, 49). They were strikingly free from any physical evidence of disease, and all of them reported excellent health with the exception of the symptoms for which they were seeking relief. The vestibular tests were observed to be of little significance. The results were usually within the normal limits, although occasionally a hyperactive response was obtained from the ear to which the symptoms of the disease appeared to be referred. In not a single instance did we observe hypertension, and roentgen studies of the skull and neurologic and ophthalmologic examinations invariably gave negative results. All in all, we were dealing with a group of persons who were in excellent health except for the annoying symptoms, tinnitus, deafness and dizziness, which characterize this disease.

Every patient in this group had been hospitalized for a period of seven to ten days when treatment was first instituted, in order to acquaint him with the proper diet and to facilitate a thorough examination. The importance of hospitalization cannot be too greatly emphasized. The patient must obtain the services of a trained dietitian, refrain from swallowing any kind of food or medicinal agents that might interfere with the regimen of sodium elimination and adhere rigidly to every therapeutic detail prescribed in this plan. All of these patients were given a low sodium, neutral diet and large doses of ammonium chloride (3 Gm. in capsules three times daily with meals for three days, then omitted for two days). After the patient had satisfactorily demonstrated that he was thoroughly familiar with his dietary management and medicinal therapy, he was discharged from the hospital.

STATISTICAL STUDIES PERTAINING TO THE RESULTS OF MEDICAL TREATMENT

In this group of 35 patients the average duration of symptoms prior to the institution of treatment was twenty-seven months; the shortest, one month, and the longest, ten years. The average period during which

the patients were observed was thirty-four months; the shortest, three months, and the longest, eight and one-half years.

Vertigo.—Twenty patients (57 per cent) had been free from vertiginous attacks from five months to four and one-half years. It was difficult to obtain accurate data in regard to the duration of vertigo-free intervals, owing frequently to the patient's inability to recall precisely the date when he had experienced the last attack. However, 9 (26 per cent) experienced an occasional mild dizziness, which was barely perceptible and did not interfere with the patient's ability to earn a livelihood. Six patients (17 per cent) complained of vertiginous attacks as severe or nearly as severe as they had experienced before medical treatment was instituted. Twenty-nine (83 per cent) of the patients were entirely satisfied with the response to the regimen of sodium elimination (as judged by relief from vertigo). Only 6 (17 per cent) felt that the results obtained by the medical regimen were unsatisfactory, and of these, 2 (6 per cent) submitted to section of the vestibular portion of the eighth cranial nerve.

Tinnitus.—The tinnitus had disappeared in 1 patient (3 per cent), while 17 (48 per cent) experienced it either intermittently or continuously but to a degree much less severe and annoying than formerly. The tinnitus was unchanged in 14 patients (40 per cent) and worse in 3 (9 per cent).

Deafness.—Audiometric studies were made for all the patients of this group. In 3 (9 per cent) it was found that the ability to hear had improved definitely, while the degree of auditory acuity was substantially unchanged in 23 (65 per cent). In the remaining 9 patients (26 per cent) there was a further reduction in hearing after the institution of treatment.

Duration of Treatment.—After they were discharged from the hospital, 8 patients (23 per cent) continued to take the low sodium, neutral diet about which they had been instructed. Of these, 9 (26 per cent) required ammonium chloride, while 26 (74 per cent) found this medication no longer necessary. Thirteen (37 per cent) were taking a modified diet, in which they ingested all types of food not distinctly salty to taste and abstained from using any free salt at the table. The remaining 14 patients (40 per cent) took a general diet without respect to its sodium content.

Analysis of Failures in Six Patients.—Two patients refused to conform to a strict dietary regimen and were unable to tolerate the ammonium chloride.

One patient had improved until twelve months before the time of writing when a heart block developed, for which he was given theophylline with sodium acetate. This resulted in the recurrence of vertigo.

One patient, a traveling man, was unable to maintain a strict dietary regimen, and he submitted to sectioning of the vestibular portion of the eighth nerve with only a fair result.

Two patients comprised the group for whom the treatment resulted in unexplained failure.

We were able to reach by questionnaire another group, 60 patients, who had been treated for Ménière's disease in our clinic. Thirty-one (52 per cent) reported that they were entirely free from vertigo and considered themselves cured, while an additional 20 (33 per cent) experienced occasional mild, much less severe vertiginous episodes. Twenty-eight (47 per cent) stated that the tinnitus was not so intense as formerly, although there was little change in their deafness. Twelve (20 per cent) reported improved hearing, but the value of this information is doubtful, because audiometric studies were not made. Nine (15 per cent) continued to have violent vertiginous attacks in spite of the treatment, and 6 (10 per cent) submitted to sectioning of the vestibular portion of the eighth nerve. While the information derived from this series of patients was obtained by questionnaire and its reliability is therefore open to question, it nevertheless reveals a rather high percentage of patients, 85 per cent, who reported improvement and expressed satisfaction with the results obtained from the medical treatment of this condition.

TREATMENT

Diet is the most important factor in the medical therapy of Ménière's disease. Not only is it imperative that the patient possess a thorough knowledge of his diet and of the possibilities of varying it in order to obtain satisfactory results and avoid dietary monotony but also that he be well acquainted with the theory of the regimen. This is as true for the successful treatment of Ménière's disease as it is for that of diabetes. It is futile and discouraging to treat these patients in the dispensary. They must enter the hospital, listen daily to the advice and warnings of a trained dietitian, adhere rigidly to the recommendations of the physician and school themselves in the philosophy of this plan.

Frequently, when treatment has failed to give satisfactory results, we have discovered that the patients were using salt substitutes, administering to themselves sodium bromide or some similar agent for "nerves" or taking sodium bicarbonate for "gas on the stomach." We have had intelligent patients assure us that they were living religiously by our therapeutic rituals, only to discover on a visit to their homes that they were taking as many as ten different nonofficial remedies, most of which contained sodium. Every salt substitute we have examined with the exception of pure potassium chloride contained sodium chloride mixed with other chemicals, and most medicaments for the nerves and stomach contain sodium in some form or another. The patient must

be admonished not to put anything into his mouth other than the foods included in the prescribed diet and the ammonium chloride. The self administration of patent medicines seems to be a reflex with some people, a habit into which they inadvertently and unconsciously fall. The only way to overcome this pernicious practice is to immure these patients in an institution and place them under heavy guard.

The source of the patient's water supply is exceedingly important. When several of our patients failed to respond satisfactorily to treatment, we discovered that they were drinking water from deep artesian wells, which contained substantial quantities of sodium chloride. The substitution of distilled or spring water was followed by prompt and complete relief from symptoms.

The administration of ammonium chloride is the next important factor in the medical therapy of Ménière's disease. This acid-forming salt is given in capsules (six 7½ grain [0.5 Gm.] capsules three times a day with meals for three days, then omitted for two days). It is important to allow a two day interval of abstinence from medication. because it can be demonstrated that this method insures the maximum effect of the drug in combining with and eliminating sodium from the body. Moreover, it is good practice to give the drug with meals, not before or after. If the patient vomits after the first large dose of ammonium chloride, it is highly improbable that he will ever tolerate the drug. The best way to avoid such a reaction is to give the preparation in divided doses between mouthfuls of food. Enteric-coated pills of ammonium chloride should not be prescribed, because they have been observed to pass through the gastrointestinal tract unchanged. The drug dispensed in capsules is the preparation of choice.

Occasionally one encounters a person who cannot tolerate ammonium chloride by any method of administration. When this occurs, this part of the therapeutic program must be abandoned. A fairly acceptable substitute for the ammonium chloride is daily exercise, such as a brisk two mile walk for a patient past 40 and more vigorous activity, perhaps, for a younger person. The effect of exercise in the elimination of sodium from the body is augmented by moderate but judicious starvation. By this is meant the daily ingestion of the minimum number of food calories compatible with the patient's mode of living and occupation.

We have no immutable rule for the duration of treatment. We arbitrarily recommend strict observance of the full regimen for a period of six weeks, after which the patient may discontinue the ingestion of ammonium chloride if he has remained asymptomatic. He continues with the salt-free diet for another six weeks and if symptom-free is allowed a small amount of sodium chloride in his cooked food but is warned not to take foods highly seasoned with salt or to use any free salt at the table. If, however, he experiences a return of symptoms,

he must revert immediately to the complete therapeutic program. Ammonium chloride in these large doses (eighteen 7½ grain capsules daily) may be administered for an indefinite time without injurious effects.

At the risk of pointing out the obvious, we must emphasize that this form of treatment cannot be expected to produce satisfactory results if there has been an error in diagnosis. It does not relieve the symptoms of a person suffering from a tumor of the acoustic nerve, cerebral arteriosclerosis or hypertensive disease. Typical Ménière's disease is not easily confused with those conditions. The dizziness associated with them is usually mild, in the nature of giddiness or an unsteady feeling, while that of Ménière's disease is a violent attack which often fells the patient in his tracks, terrifies him and renders him totally incapacitated for from several minutes to several hours. We have never seen a vertiginous attack of such proportions in a patient with an auditory neuroma or a tumor of the cerebellopontile angle, and we are disposed to say that when one observes a severe seizure of dizziness, one is probably not dealing with either of these lesions.

SUMMARY

We do not advance the hypothesis that a general disturbance of fluid or of sodium metabolism occurs in Ménière's disease, but we have long entertained the idea that a lesion is present within the involved otic labyrinth which allows accumulation or retention of sodium ions, thus producing a chemical or a pressure alteration which causes the attacks of vertigo. The observation by Hallpike and Cairns [3] of distention of the endolymphatic spaces and absence of the "normal" perisaccular area about the saccus endolymphaticus of the involved ear in 2 patients with Ménière's disease examined post mortem adds weight to this contention.

Our experience with the treatment of Ménière's disease by the elimination of sodium has been gratifying. Eighty-three per cent of our patients have reported satisfactory results with this therapy. It would be impossible to explain satisfactorily the absence of vertiginous attacks in this group on the basis of spontaneous remissions, for the reason that frequently we have observed the prompt recurrence of vertigo when patients have become careless about the prescribed diet or when they have attempted to abandon it. Moreover, the prompt disappearance of symptoms with the institution of treatment has been so striking in many patients that it would not be logical to assume that remissions could be so specifically timed. Brown,[5] Bartels [6] and others also have reported gratifying results with this therapy.

5. Brown, M. R.: The Medical Treatment of Ménière's Syndrome, J. A. M. A. **108**:1158-1160 (April 3) 1937.

6. Bartels, E. C.: Diagnosis and Treatment of Ménière's Disease, M. Clin. North America **22**:695-700 (May) 1938.

Emphasis must be placed on the importance of hospitalization of the patient and his sedulous adherence to every detail of the therapy previously described. The duration of treatment and the time for its discontinuance are matters of arbitrary decision and must be left to the method of trial and error.

The effect of this treatment is only the relief from vertiginous attacks. No promise can be given the patient in regard to improvement of the auditory function or abatement of tinnitus. The noises in the ears occasionally subside, although the deafness is usually progressive.

Surgical intervention is resorted to only when an adequate trial of medical therapy is fruitless. It is our procedure to section the vestibular portion of the eighth cranial nerve in patients suffering from Ménière's disease only after the elimination of sodium has failed. We have arbitrarily chosen a trial period of three months. In the past five years, only 6 patients with Ménière's symptom complex at the University Hospital have had partial sectioning of the eighth cranial nerve.

ADDENDA

Treatment of Ménière's Disease.—The patient takes a diet free from salt and soda. This means that no salt is used at the table or in cooking. The patient is put on a rather strict diet, as herein recommended. Ammonium chloride is given as follows: six 7½ grain (0.5 Gm.) capsules, three times a day (with each meal). This means a total of eighteen 7½ grain capsules of ammonium chloride per day. They are taken while the patient eats his food, and they must not be replaced by the chocolate-coated or the enteric-coated pills, because the latter sometimes pass through the gastrointestinal tract without being absorbed. The ammonium chloride is given in this dosage for three days and then omitted for two days. This can be carried on indefinitely without injurious effects. The patient's ingestion of fluids is not restricted, although he must not drink excessive quantities of liquids.

Diet (see following section):

1. Low sodium content; i. e., no salt, soda or baking powder is to be used.
2. Animal protein and cereal products unrestricted (except milk).
3. Vegetables, fruits and milk limited.
4. Calories sufficient to maintain a desirable weight.
5. Water unrestricted.

Medication: Ammonium chloride in capsules, 3 Gm. with each meal (six capsules, each containing 7½ grains [0.5 Gm.], taken during the meal) for three days, then omitted for two days.

Approximate Neutral Low Sodium Diet.—The following foods should be taken daily in the quantities suggested.

1. Eggs, meat, fish and fowl as desired—at least two large servings.
2. Bread as desired, preferably whole wheat. It must be made without salt. Use at least five slices.

3. Cereal—one of the following: farina, whole wheat cereal, oatmeal, rice, puffed rice or puffed wheat.

4. Milk, cream or both—not more than two glasses daily.

5. Potato—one serving daily.

6. Vegetables—two servings chosen from the following list; one should be eaten raw. (Use fresh or frozen vegetables or those canned without salt.)

Asparagus	Eggplant	Squash, summer
Broccoli	Green peas, fresh	Squash, winter
Cabbage	Mushrooms	String beans, fresh
Cauliflower	Onions	String beans, raw
Chicory or endive	Pepper, green	Tomatoes, fresh
Corn	Pumpkin	Turnips
	Radishes	

Note: All food is to be prepared and served without the addition of salt, soda or baking powder.

7. Fruits—two servings chosen from the following list; one or both should be eaten raw.

Apple, fresh	Grape juice	Peach, fresh
Banana	Grapefruit, canned	Pear, fresh
Blueberries, fresh	Grapefruit, fresh	Pineapple, canned in syrup
Cherry juice	Lemon	
Currants, dried	Lemon juice	Raspberries, canned
Currants, fresh	Nectarine	Raspberry juice
Grapes	Orange	Watermelon
	Orange juice	

Note: Plums, prunes and cranberries may be taken as desired, in addition to the two servings requested.

8. Unsalted butter, cream, honey, jellies, jams, sugar and candy as desired.

9. Tea and coffee as desired.

PROPHYLAXIS OF THE COMMON COLD

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There can be drawn a fairly apt analogy between war and the invasion of the tissues of the upper respiratory tract by the organisms which give rise to the common cold. In accordance with this analogy, the invading forces in infections of the upper respiratory tract are the many pathogenic bacteria associated with respiratory disease. The defenses of the nose against such invasion are twofold—the front line, which consists of the mucous blanket and ciliated epithelium of the nasal mucosa, and the second line, represented in the natural immune responses of the tissues to such bacteria.

The importance of maintaining an adequate first line of defense has been stressed by Proetz,[1] Hilding,[2] Lierle [3] and others. They have pointed out the factors which tend to break down these defense mechanisms. The fifth column activities of a dry hot atmosphere, of metabolic disturbances, of dietary insufficiencies and the like are well known and deserve special attention. But unfortunately, the exigencies of modern living make possible the attacks of fifth columnists such as these, and the first line of defense is constantly weakened.

Another important factor in the invasion of the tissues of the upper respiratory tract, which, again in the terminology of war, may be likened to the parachute troops, is the virus of the common cold. Its attack is of minor importance if unsupported. It does, however, prepare the ground for the main advance of the pathogenic bacteria by destroying the first line of defense. The virus unsupported by the secondary invaders is short lived.

As the habits of modern life do not permit persons to live in an ideal environment as far as the nasal defenses are concerned, one must

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1. Proetz, A. W.: Effect of Temperature on Nasal Cilia, Arch. Otolaryng. **19**:607 (May) 1934; Nasal Ciliated Epithelium, with Special Reference to Infection and Treatment, J. Laryng. & Otol. **49**:557 (Oct.) 1934.

2. Hilding, A.: Physiology of Drainage of Nasal Mucus, Arch. Otolaryng. **15**:92 (Jan.) 1932.

3. Lierle, D. M., and Moore, P. M.: Effects of Drugs on Ciliary Activity of Mucosa of Upper Respiratory Tract, Arch. Otolaryng. **19**:55 (Jan.) 1934.

endeavor to build an adequate second line, so that when invaders penetrate the frontiers of the upper respiratory tract they may be met and checked before they can establish a base from which to spread. Such a second line of defense consists of phagocytic cells and specific antibodies which can immobilize and destroy the invading organisms.

For years vaccines of the pathogens common to the respiratory tract have been administered subcutaneously or orally in an endeavor to enhance the immune responses of the body against these pathogens. That the results have not been satisfactory is seen by examining the literature on the subject. When vaccines have been used in large and well controlled series of cases, the incidence of colds in the vaccinated patients differed slightly, if at all, from that in the control group. There is not time to enumerate here the contributions on the subject, but they are summarized by Diehl [4] in a report of his experiments at the University of Minnesota, published in the *Journal of the American Medical Association* in 1938.

In considering wherein lies the failure of such vaccinations, one is led to conclude either that the organisms which attack the respiratory tract are on the whole poor antigens or that if they do stimulate production of antibodies adequately, these antibodies are not present in the vulnerable nasal tissues in sufficient concentration to be effective. It is well known that the ideal condition of tissue immunity is one in which there are in the tissues both mobilized phagocytes and specific antibodies. This condition may be obtained in the skin by the local injection of vaccine. The question arose whether it could be obtained also in the nose by the application of vaccine to the nasal mucosa.

In an endeavor to investigate this question, Dr. Paul Cannon and I applied vaccine to the nasal mucosa of rabbits by dropping the substance into the nose, using a tuberculin syringe without a needle and taking care that no trauma was inflicted. At varying periods after vaccination and at different intervals between vaccination and death, we removed the nasal mucosa, spleen, lungs and other tissues from the rabbit, together with blood serum, extracted these tissues with saline solution and set up agglutination titrations against the homologous organism. We found that after local vaccination the antibody titer of the nasal mucosa was constantly higher than that of the spleen, liver and other tissues. It was frequently as high, and occasionally higher, than that of the serum.

On the other hand, when we immunized rabbits with the same vaccine by subcutaneous injection, the antibody titer of the nasal mucosa was seldom as high as that of the spleen and was always lower than

4. Diehl, H. S.; Baker, A. B., and Cowan, D. W.: Cold Vaccines: Evaluation Based on Controlled Study, J. A. M. A. **111**:1168-1173 (Sept. 24) 1938.

that of the blood serum. We found further that the antibody produced was entirely specific, so that, for example, if Bacterium Typhosum was used as an antigen there was no cross agglutination with Bacterium paratyphosum B, and vice versa. We also found in microscopic sections of nasal tissues from the vaccinated animals that there was a subepithelial accumulation of macrophages and lymphocytes which was not present in the animals which were vaccinated subcutaneously. In examining the results of both the subcutaneous and the local vaccinations, we found

TABLE 1.—*Agglutinin Titers of Tissues and Blood Serum of Rabbits Immunized Intranasally Against Bacterium Paratyphosum B After Nonspecific Stimulation of the Nasal Mucosa with a Solution of Formaldehyde (1:333)*

Animal	Days of Treatment with Formaldehyde	Days of Vaccination	Day of Death	Titer				
				Blood Serum	Nasal Mucosa	Spleen	Lung	Liver
25	1	4	4	120	480	0	0	0
26	1	4	4	240	480	0	0	0
27	1	4	5	240	480	0	0	0
28	1	4	5	0	0	0	0	0
29	1	4	6	0	0	0	0	0
30	1	4	6	480	240	0	240	0
62	1	4	5	480	0	0	0	0
63	1	5	6	960	240	120	480	0
41	3	7	4	120	240	0	240	0
40	3	8	4	480	240	0	0	0
39	3	3	4	480	120	0	0	0
38	3	9	4	960	960	0	240	0
37	3	9	4	960	240	0	0	120

TABLE 2.—*Agglutinin Titers* of Tissues and Blood Serum of Rabbits Immunized Against Bact. Paratyphosum B by Subcutaneous Injection of Vaccine*

Animal	Blood Serum	Nasal Mucosa	Spleen	Lung	Liver
21	960	0	240	0	120
22	960	0	240	0	0
71	1,920	0	120	240	120
72	1,920	480	240	480	120

* Titrations were not taken above 1:1,920.

that the average ratio of tissue antibodies to serum antibodies (the T. S. ratio) was 1:10 for parenterally administered vaccine, whereas when the antigen was administered locally, the average T. S. ratio was 1:5. The specificity of the reaction led to a further experiment, which was done to determine whether antibodies are formed locally or accumulate in the tissue because of inflammatory reactions. In this experiment we vaccinated rabbits by two methods with two antigens at the same time. We used Bact. paratyphosum B locally in the nose and Bact. Typhosum administered by intraperitoneal injection. At appropriate periods after vaccination the tissues and serum were extracted and agglutination titra-

tions against both antigens made. Table 3 shows the results, and it is seen that when the blood serum titer with the two antigens is the same, the titer in the mucosa for the locally applied antigen is many times higher than that for the antigen administered parenterally. It seemed reasonable to conclude from these experiments that there is a local formation of antibodies and at the same time a mobilization of phagocytes in the tissues—the ideal condition for tissue immunity. It followed, therefore, that if any protection against colds by the use of vaccine was to be hoped for, the rational method of immunization was by the application of vaccine to the nasal mucosa. To this end we prepared polyvalent formaldehyde-killed vaccine from cultures taken in the ear, nose and

TABLE 3.—*Agglutinin Titers of Tissues and Serum of Animals Vaccinated Simultaneously with Two Antigens—One Administered by Intraperitoneal Injection, the Other by Intranasal Application*

Animal	Antigen	Blood Serum	Nasal Mucosa	Lung	Spleen	Intestine
56	General	960	30	30	240	0
	Local	120	30	30	0	0
59	General	1,920	240	60	480	0
	Local	240	240	0	30	0
60	General	960	30	120	480	0
	Local	960	120	240	60	0
61	General	3,840	240	240	480	120
	Local	480	240	240	60	0
62	General	1,920	120	120	120	60
	Local	240	120	120	0	0
67	General	960	60	120	120	60
	Local	480	480	480	30	0
68	General	960	120	120	120	0
	Local	960	240	480	30	0
70	General	960	30	30	120	0
	Local	960	240	480	60	30

throat clinic. The vaccine contained many strains of all the pathogens common to the respiratory tract.

Patients who complained of frequent colds were treated by spraying the vaccine into the nose each night during the season when colds are prevalent. In recording results of the use of vaccine in the prevention of colds it has been the custom of most observers to record the total number of colds in the group of subjects in the year before the vaccine was used and again in the year the vaccine was given and thereby to arrive at the average number of colds per person before and after the administration of vaccine. The percentage reduction of the number of colds in such a group is taken as a criterion of the efficacy of the vaccine. I felt that this was perhaps an incorrect method of recording the results, because, as Diehl pointed out, patients are vague as to the exact number of colds they have experienced in previous years. For our results, therefore, we established the following criteria. If patients had no colds or

perhaps one mild cold lasting not more than forty-eight hours, the result was said to be good. More than two attacks of rhinitis, even though of short duration, and not more than three such attacks constituted a fair result. More than two mild colds or even one severe cold, in spite of the patient's protestations of improvement, was labeled a bad result. The results on the basis of these criteria are seen in table 4.

In order to control this clinical experiment I obtained the cooperation of Dr. Dudley B. Reed, of the student health service at the University of Chicago. Students who came for prophylaxis against colds were given alternately solutions "A" and "B" as sprays. "A" was the

TABLE 4.—*Summary of Results of Vaccination*

Year	Number of Patients	Good		Fair		Combined		Bad	
		Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
1932-1933	24	19	79	1	4	20	83	4	17
1933-1934	66	45	68	8	12	53	80	13	20
1934-1935	79	63	80	8	10	71	90	8	10
1935-1936	100	76	76	12	12	88	88	12	12
1936-1937	108	80	74	13	12	93	86	15	14
1937-1938	101	78	77	7	7	85	84	16	16
1938-1939	90	65	72	10	11	75	83	15	17
1939-1940	59	38	66	6	10	44	76	15	24
Total	627	464	74	65	10	529	84	98	16

TABLE 5.—*Results of an Experiment*

	Number of Patients	Good		Fair		Combined		Bad	
		Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Vaccine.....	74	46	62	11	15	57	77	17	23
Control.....	74	37	50	..	..	37	50	37	50

vaccine and "B" a suspension of starch in saline solution, with 1 : 10,000 merthiolate added, to make it smell the same as the vaccine. The physicians in the clinic did not know which was the vaccine and which was the control. The students were unaware that an experiment was in progress, and I did not see the students. At the end of the year Dr. Reed and his staff sent me the case histories of the students, and I evaluated the results of the experiment from these histories. I hoped in this way to eliminate any possible bias on my part in the evaluation of the results, which are seen in table 5.

It is interesting to note that there were 50 per cent good results in the control group. This bears out, I believe, Diehl's observations that the memory of colds in previous years is vague. There occurred also in our series of clinic cases a chance to control the effects of the vaccine, because some patients who used the vaccine one year with good results

felt that they were immune for the future and did not use it the second year. They had just as many colds as before.

I published the histories of several such cases recently in reporting the results of these experiments.[5] It was interesting to note further that in many cases patients volunteered the information that they felt they were contracting severe colds and had a period of perhaps twenty-four hours of acute rhinorrhea, which subsided without further complications. I myself have experienced similar attacks, which I felt probably were due to the virus of the cold.

If there is sufficient immunity against the secondary invaders, such virus-caused colds are self limiting and are usually over in twenty-four to forty-eight hours.

To summarize, therefore, there is ample experimental evidence to indicate that the rational method of vaccination against so local a disease as the common cold is the application of vaccine to the vulnerable nasal tissues. The clinical application of this principle showed that with a total of 627 patient years of vaccination, in 74 per cent the results were good, in 10 per cent the results were fair and in 16 per cent the results evidenced failure. The results warrant, I believe, the further trial of this method in the prevention of the common cold.

ABSTRACT OF DISCUSSION

Dr. John J. Shea, Memphis, Tenn.: Dr. Walsh has presented experimental work which may be the beginning of a better knowledge of the nose and the accessory sinuses. The physiologists have neglected the study of the nose, and in the modern textbooks on physiology one fails to find an extensive discussion of the natural defenses of the nose. Rhinologists have been made cilia conscious by the wonderful photographs of the wavelike movements of these hair cells. They have endowed the presence of the cilia with possible unproved powers of protection. A patient who is noticeably free from acute colds possesses a healthy-appearing nose, while the nose of one with frequent colds reveals demonstrable disease. Rhinologists are widely divided in their opinions as to the function of the nose and its accessory sinuses. There are those who consider the sinuses merely as cavities for the collection of secretions, while there are others who consider the sinuses as a vital factor in autoimmunization against infections from one's environment.

The principle used by Dr. Walsh in making up the vaccine is similar to the practice which my associates and I have followed for a number of years in making our own vaccines. That is, a good vaccine should be made from the infective agents of one's environment at the time. We save and propagate continuously in the laboratory cultures of material taken from acutely infected sinuses and mastoids and of any virulent infective pathogens which we can get from time to time, and we are constantly changing our vaccine throughout the year.

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5. Walsh, T. E.: Intranasal Vaccine Spray: Its Use in Prophylaxis Against Common Cold, Ann. Otol., Rhin. & Laryng. **49**:875 (Dec.) 1940.

It has been noted by us that Friedländer's bacillus appears in the colds of the fall only. As winter comes on, it loses its place, and we then have more cultures of the hemolytic streptococcus and Staphylococcus aureus. This work may be the beginning of a change in the attempt to immunize patients against the ordinary common cold, which is a great liability to the American public.

Kistner and Lynch demonstrated that the mucous membrane of the sinuses absorbs bacteria. Fenton contended that the sinus membrane was active in immunization against infections. Swindle's demonstration of the vascular structure of the nasal and sinus membrane emphasized the importance of the role that circulation plays in the life cycle of the nose. The nasal administration of the pertussis antigen has proved to be effective clinically. I believe that the intranasal administration of a vaccine would not only create a general immunity but would likewise increase a local immunity.

I should appreciate a statement from Dr. Walsh as a record of his views on the role of the nose and sinuses in the maintenance of natural immunity to the infective organisms in one's individual environment.

Dr. W. B. Hoover, Boston: I wish to thank Dr. Walsh for his paper; it was interesting and intriguing. His arguments seem good. Almost every one who has used vaccines has put out a good argument for their use, and Dr. Walsh discards them as not effective. I think he is probably right.

I am always skeptical about accepting such a statement as Dr. Walsh has given, because so many others have made similar statements which have passed more or less by the board.

I should like to ask Dr. Walsh, since his method provides local immunity, if he feels that spraying one side of the nose will give local immunity to that one side of the nose, while the other side remains subject to colds. Would he try that experiment with people who are known to have colds?

Dr. S. C. Missal, Cleveland: I should like to ask Dr. Walsh if he included the cold virus, or whether he used just the organisms he found in the respiratory tract.

Dr. Theodore E. Walsh, St. Louis: In answer to Dr. Shea: Yes, I think the nose and sinuses play a great role in the defense against environmental infections. They are probably the chief portal of entry for most of the disease that flesh is heir to, one of the major portals at any rate; and I believe that if good nasal defense can be maintained much of the disease that human beings are subject to will be eliminated.

It may be of interest that in immunization against scarlet fever, for example, one can spray the nose with scarlet fever streptococcus toxin and get excellent immunity. I had to be immunized, and I had seen so many people with marked generalized reactions to "shots" that I decided I would try placing the toxin in the nose. I sprayed my nose with scarlet fever toxin, and my reaction to the Dick test from strongly positive became negative, without any ill feeling or even soreness in the nose. I repeated the experiment on several of my co-workers, and we all experienced the same result.

Dr. Hoover, I didn't try immunizing one side. As a matter of fact, I was interested in seeing if I could keep people free from colds. What you have suggested sounds like an intriguing experiment. I shall try it. I don't know whether it will work.

The tissues of the nose and sinuses are fairly continuous, and I believe that when there is a local accumulation of antibodies, these are apt to diffuse rather

well through the tissues locally. Whether one could get a clearcut, one-sided cold or not I don't know.

In reply to Dr. Missal: No, this vaccine contains no cold virus. Many of our patients had so-called virus colds. By that I mean that they had a tremendously acute profuse rhinorrhea with a general feeling of malaise, and the whole thing was over in twenty-four hours and was not followed by the usual process which occurs in a cold.

There is one other point. This vaccine is sprayed in. If the patient inhales and it goes down into the chest and tracheobronchial tree, I think that is all to his advantage. One patient stands out in my mind. She complained not so much of having head colds as of having a very mild cold followed by bronchitis which would last during the winter months. After using this vaccine she did not have any bronchitis. She was greatly pleased about this. I think this good effect probably resulted from inhaling the vaccine right down into the chest. The routine of using the vaccine every night is essential, because the immunity does not last long. The antibodies that are formed locally in the mucosa diffuse readily into the circulation. One must keep up the applications of vaccine during the period when colds are prevalent.

That is one thing which I want to emphasize, because if one thinks that by spraying the nose for, say, the first six weeks of the cold season and then stopping, he is going to get results, he will be greatly disappointed. The patient must keep up the immunization. The vaccine is easy to apply just before going to bed. The application doesn't hurt, and the vaccine gives no undesirable reaction.

PHYSICAL REHABILITATION OF THE LARYNGECTOMIZED PATIENT

WALLACE MORRISON, M.D.
NEW YORK

It has been my privilege to study a considerable number of patients who have undergone complete laryngectomy for cancer. The majority of these patients came with their operative wounds recently healed, at the time when they were about to pass from the hands of laryngeal surgeons and return to their often distant homes. For this reason, they have been seen from a point of view rather different from that of either the general practitioner of otolaryngology, who sees the patient first and is chiefly concerned with the problem of the diagnosis of the laryngeal lesion, or the laryngeal surgeon, who looks on the patient as presenting a surgical problem and naturally has given his thought and energy to the difficulties of the surgical attack and of the postoperative care. As times passes, all of these problems are met and solved; then an entirely new set of problems comes into view. It is with these that I wish to deal briefly. They and the patients who present them have formed a fascinating study.

In the usual course of events laryngectomized patients leave the hospital, return to their families and begin to face the many problems of social contacts and the resumption of work, since most of them are wage earners. It is only at this time that many of these persons realize fully the meaning of the total loss of the power of intelligible speech. They find themselves cut off from friends and relatives and from business or professional associates by the barrier of total aphonia. In many such patients profound mental depression results. If they have dependents whom they must support financially or a business or a professional career that has been interrupted by laryngectomy, acute worries about their obligations and financial security may make them unhappy indeed. Another factor in the mental depression, which may be most carefully hidden from those about them, is the knowledge which all of these patients of ordinary intelligence come to have—that their disease was cancer. They learn a good deal about this dread disease, including the fact that it may recur at any time, even years after an apparently successful surgical removal. They cannot but be distressed by this knowledge.

Read at the Sixty-Third Annual Meeting of the American Laryngological Association, Atlantic City, N. J., May 30, 1941.

In some instances this mental depression is obvious to any beholder, since it is freely expressed in the demeanor and the written words of these unfortunate persons. In others the depression is buried beneath a mask, which is quickly dropped in the presence of an understanding and sympathetic physician. It is my wish to direct attention to these facts, since they have been appreciated in the past only by those having many contacts with recently laryngectomized patients.

It is my humble opinion, based on the study of these people, that the way to solve the worst of their problems and to cure their psychic depression is to get them busy at the earliest practicable moment in an endeavor to learn to talk again by developing a pseudovoice. This at once gives them a new aim in life and holds out the hope that if they work steadily and patiently they will soon be able to return to normal contacts with family and friends and to resume their work and earning power. Such a return to their usual activities is also surely the best antidote for their fear of a return of the malignant condition.

A laryngectomized patient meets his problem of the total loss of voice in one or more of several ways. He may depend entirely on paper and pencil, making no effort to talk at all. Usually, he finds this method so slow, inefficient and tiresome that he develops a pseudo whispered voice. This he produces by exaggerated movements of articulation with the small amount of air normally present in the mouth and oropharynx and by making various friction sounds, with which he tries to form words. These consist of consonant sounds only; the prolonged vowel sounds cannot be made, because there is nothing which can act as a glottis to produce sustained vibrations and toned sounds. This pseudo-whisper, which is tiring to produce and extremely difficult for any one not thoroughly used to it to understand, is an exceedingly poor substitute for a voice; it cannot be understood over the telephone at all. Hence, it is an inefficient means of speech, not to be recommended. In fact, it is better for a patient not to try to produce the pseudowhisper at all, for once he comes to rely on it he will have more difficulty in learning to produce the true pseudovoice than if he merely uses pencil and paper to make his wants known.

The third solution for the loss of the voice is the use of one of the several forms of artificial larynx. These instruments, despite their comparative mechanical perfection and the ease with which most laryngectomized patients learn to use them, nevertheless have certain great disadvantages. None of them produces a tone that even remotely resembles the human voice. All of them are cumbersome; they can suddenly fail to function, leaving the patient completely voiceless, and by their appearance and sound they immediately put the user in the spotlight of attention. This is embarrassing to a sensitive person, and many avoid the use of the instrument except when with friends or close

business associates. Many patients who have learned to use the apparatus well and are able to carry on their work, since the sounds produced with it are well understood over the telephone, are still not happy with it. They feel that it is merely a prosthesis, directing attention to their unfortunate condition and all too often leading to unwelcome questions and discussions regarding cancer of the throat by thoughtless friends. In my judgment, the use of an artificial larynx should be reserved for those who are content with its disadvantages and for those who cannot or will not learn to produce the pseudovoice.

The fourth method of overcoming the total aphonia is the learning of the use of the pseudovoice. This voice is produced with the patient's own organs and consists of all the vowel sounds and all the consonants except the aspirant sound "h." It is perfectly intelligible to any one, once it is acquired, and can be used without embarrassment anywhere at any time, never gets out of order because of mechanical failure and sounds exactly like human but rather hoarse and guttural speech, of the type produced by a patient with acute laryngitis. To me, it is by long odds the method of choice and should always be striven for by laryngectomized patients.

The pseudovoice is produced by aspirating and swallowing air into the hypopharynx and esophagus, from which it is brought out again, at least in part by voluntary control, to produce a belching sound by setting into coarse vibration some portion of the walls of the hypopharynx, which thus acts as a pseudoglottis. This guttural sound is changed by the articulating action of the tongue, palate, teeth, cheeks and lips into the sounds of speech. There are thus three parts of the apparatus—an air reservoir in the upper part of the alimentary tract, a pseudoglottis and the articulating mechanism of ordinary speech. That this is truly the mechanism of the production of the pseudovoice in the great majority of cases is illustrated by a series of roentgenograms taken with the aid of an esophageal barium sulfate contrast mixture. The subject was a patient who produced the pseudovoice in the typical way and who became expert and able to control the mechanism in such a remarkable fashion that these pictures could be made at the intervals to show the action most clearly.

Thus, one notes that the action begins with the aspiration of air into the hypopharynx by contraction of the suprahyoid and infrahyoid muscles, which act as a diaphragm, until the hypopharynx is considerably dilated (figs. 1 and 2). Air is also swallowed, so that the lumen of the esophagus becomes filled completely and dilated all the way down to its cardiac end. Some of the swallowed air slips through the cardiac opening of the esophagus into the stomach, where it brings about a marked increase in the size of the normal gastric air bubble (figs. 3 and 4). This is not a necessary part of the aspiration of air, and it adds

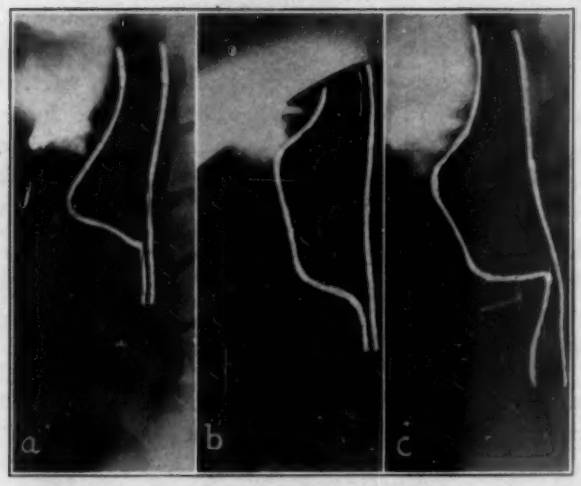

Fig. 1.—Retouched roentgenograms of the hypopharynx (lateral view), showing: (*a*) the normal hypopharynx of a laryngectomized patient without a tracheal cannula; (*b*) the hypopharynx dilated with aspirated air, and (*c*) the hypopharynx dilated with aspirated air to its maximum capacity, just before the expulsion of the air and the production of a sound.

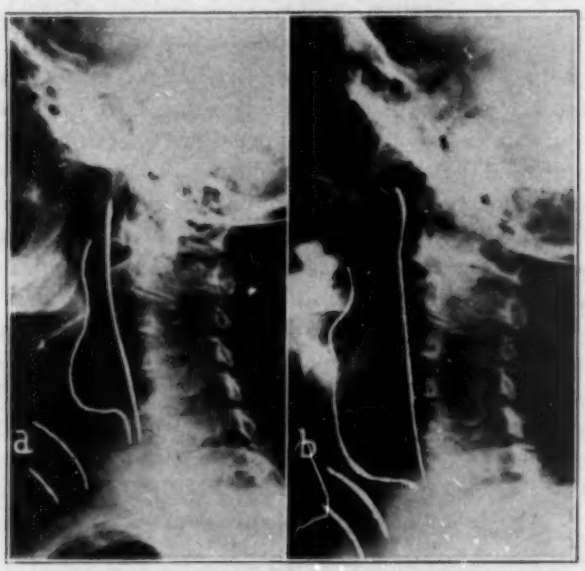

Fig. 2.—Retouched roentgenograms of the hypopharynx (lateral view), showing: (*a*) the normal hypopharynx of a laryngectomized patient without a tracheal cannula (tracheal opening) and (*b*) a huge dilatation of the hypopharynx with aspirated air just before the expulsion of the air and the making of a sound.

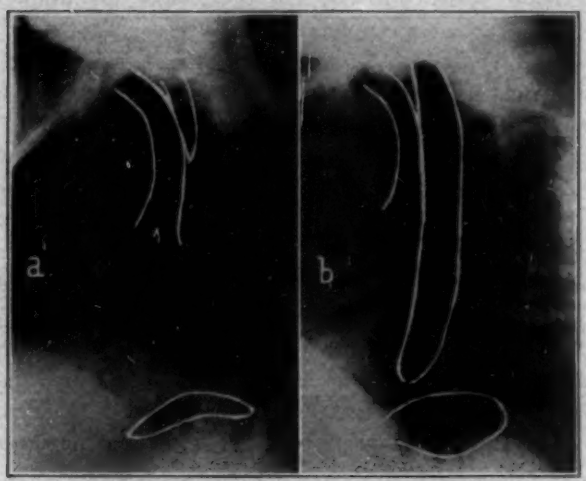

Fig. 3.—Retouched roentgenograms of the thorax (lateral oblique view), showing: (*a*) the trachea, a small amount of air in the upper part of the esophagus and a normal gastric air bubble and (*b*) the esophagus enormously dilated with swallowed air and the gastric air bubble increased in size just before the expulsion of the air and the production of a sound.

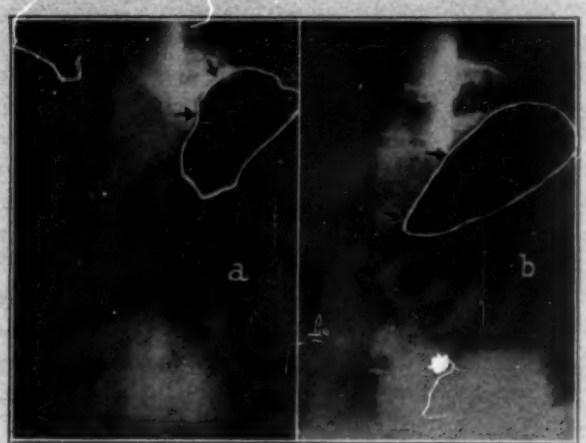

Fig. 4.—Retouched roentgenograms of the upper part of the abdomen (anteroposterior view), showing: (*a*) a normal gastric air bubble and (*b*) a dilated gastric air bubble prior to phonation. Some of the air swallowed slips from the esophagus into the stomach, where it may be expelled, along with the air in the esophagus, in producing the pseudovoice.

to the ability of the patient to speak only if he learns to regurgitate the air from the stomach along with that from the esophagus. This is rather difficult for some patients to do, and the gastric dilatation may cause distress until the excess air is belched out.

The phase of the exit of the air from the hypopharynx and esophagus begins as soon as aspiration ends (figs. 5, 6 and 7). The air passing out of the reservoir sets some fold of mucosa into coarse vibrations which make the low-pitched belching sound with which the patient learns to talk. The vibrating muscosal fold, or surface, is called the pseudoglottis. Its exact position cannot be determined by ordinary methods. The action is much too rapid for ordinary cineroentgenography; thus far, ultrahigh speed cineroentgenography has not been available for the study of laryngectomized patients. Nothing of the pseudoglottis can be seen with the laryngeal mirror or direct larynoscope, as these patients cannot make any sound with the mouth wide open. It is usually supposed that the pseudoglottis lies deep within the hypopharynx, possibly at the level of the cricopharyngeus muscle at the entrance into the esophagus.

As a matter of fact, the problem of the location and nature of the pseudoglottis is largely academic, and one need not worry about it in teaching patients the use of the pseudovoice; if the patient can learn to swallow air and to belch it to make any kind of sound, a pseudoglottis will develop. There naturally arises in one's mind the question of the construction, by some sort of plastics procedure carried out during the laryngectomy, of mucosal or muscular bands to form a pseudoglottis. This has been tried by numerous surgeons, but the resultant bands, at least in my experience, have never aided in the slightest degree.

Experience teaches, however, that the surgeon must make every effort not to damage or sacrifice any structure outside the laryngeal box, which is not involved by the cancer unless this is unavoidable. If the musculature and the nerve and blood supply of the hypopharynx and the upper part of the esophagus are preserved as fully as possible, their use in the production of the pseudovoice will be made easier and more efficient, and the resultant voice will be stronger and more easily formed. This consideration applies to the control of the swallowing and expulsion of air from the esophagus particularly, since it has been shown that at least a portion of the musculature of the upper part of the esophagus is striated muscle, probably partially under voluntary control and supplied by fibers from the recurrent laryngeal nerves. The preservation of such a nerve supply is highly important from the functional point of view.

The teaching of a laryngectomized patient to produce the pseudovoice should follow a simple but definite routine. After a careful examination of the upper part of the respiratory tract and of the heart and

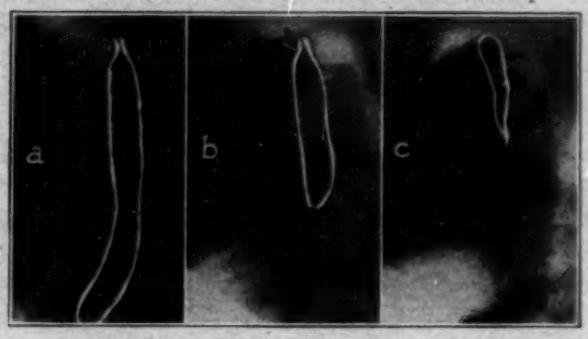

Fig. 5.—Retouched roentgenogram of the thorax (lateral oblique views), showing: (*a*) the esophagus filled with air and dilated down to its cardiac entrance into the stomach; (*b*) the esophagus partly emptied of air by the production of the pseudovoice as the patient counted up to five, and (*c*) the esophagus emptied of most of the swallowed air.

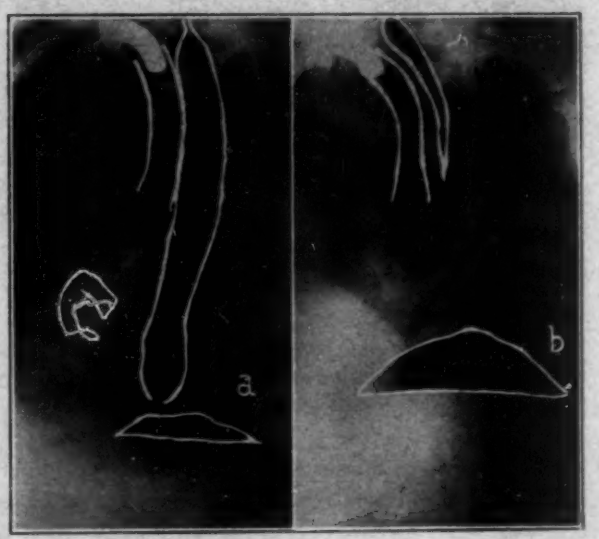

Fig. 6.—Retouched roentgenogram of the thorax (lateral oblique views), showing: (*a*) the esophagus enormously dilated with swallowed air and a normal gastric air bubble and (*b*) the almost completely emptied esophagus after the production of the pseudovoice as the patient counted up to ten. A considerable amount of the swallowed air has slipped through into the gastric air bubble but was not regurgitated to produce the pseudovoice, so that the bubble is much enlarged.

lungs, which acquaints the teacher fully with the anatomic situation, he should begin by giving an explanation, couched in nontechnical language as far as possible, of the anatomic reasons for the loss of the voice and of the changes in the respiratory tract produced by the laryngectomy. The fact that the lungs can no longer be used as an air reservoir for speech must be made clear. The use of the lower part of the pharynx and esophagus to replace the lungs as bellows for speech must be explained. The need for control of the ordinary respiration through the tracheal tube or stoma must be discussed. This respiration must be controlled, to prevent the masking of the sounds produced with the pseudovoice by the blowing noise made by forceful and rapid movements of the chest. If the patient does not learn to control this respiration as he tries to talk, his pseudovoice will be almost unintelligible to

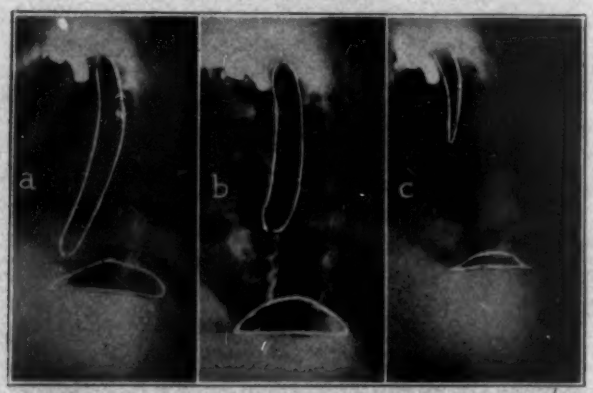

Fig. 7.—Retouched roentgenograms of the thorax (lateral oblique views), showing: (*a*) the esophagus filled with swallowed air and the gastric air bubble increased in size; (*b*) the esophagus partially emptied of air by the production of the pseudovoice with the patient counting up to five (the gastric air bubble has not diminished in size), and (*c*) the esophagus almost completely emptied of air by the production of the pseudovoice while the patient counted up to ten. In *c* there is noticeable diminution in the size of the gastric air bubble, indicating that the air was regurgitated from the stomach to produce the pseudovoice when prolonged counting was done.

the casual listener. When the patient understands these matters fully, one proceeds to instruction in the first steps toward producing the pseudovoice.

The patient must first learn to gulp or swallow a large mouthful of air and to let it come out again with a belching sound. This he must practice patiently, standing before a large mirror so that he may watch his movements and making his swallow and belch *between* ordinary breaths. This will be his first difficulty, but it can be overcome by patience and practice. At first the practice periods should be brief and

not too frequent; I advise ten minute periods not more often than six to eight times a day. The patient must not in his eagerness to attain results quickly work so hard as to make the nuchal and pharyngeal muscles sore; if these become lame, all efforts must be given up and heat and massage applied to the anterior cervical area. The duration and the number of the exercise periods are increased as the musculature becomes stronger with training.

At first the patient will be able to make only a small low-pitched sound. From the start he should be encouraged to change this into a single guttural syllable, such as "goo" or "good." Such guttural sounds, formed low in the hypopharynx, are most readily produced and seem to help in the development of the pseudoglottis. The utterance of an actual word that his friends can understand gives great delight to the patient and serves as a powerful psychic stimulus.

When the patient can aspirate air and belch it at will to make a single sound, he can progress to trials at making any sort of single sound; the vowel sounds, counting and short words of any kind may be tried. Some words are easier to produce than others; they should be used for constant practice. Facility grows steadily with exercise. Soon the patient will find that he can swallow enough air and control his belching sound well enough to say words of two syllables or two or three short words per swallow of air. From this point he usually progresses rapidly and almost spontaneously to a halting, imperfect but intelligible speech. He learns how many sounds he can make with each swallow of air and paces his speech with this capacity. In time, most patients learn to say three or four words per swallow; experts easily say ten words before they have to stop to aspirate air again.

Throughout the period of working with his problems, the patient must be encouraged and guided and must have his faults corrected with the utmost kindly firmness. He must again and again be cautioned that patience is necessary and progress slow but steady. His struggles are made much easier if he can have occasional contact with those who have already learned to use the pseudovoice; these advanced students give the new ones invaluable help and encouragement. If such help is not available, the use of recordings of the voices of such advanced patients on a small phonograph is of great help. The use of sound moving pictures would be ideal, but thus far the cost has prevented me from using such help.

The best time to begin to learn to use the pseudovoice is as soon as the surgical wounds have soundly healed and a general condition of good mental and physical tonus has been achieved by postoperative care. This is usually from six to eight weeks after operation. During convalescence the patient should not try to whisper but should make his wants known with pencil and paper or by signals.

There is no reason why patients who have long since been operated on should not try to learn to use the pseudovoice; they will have certain difficulties in forgetting their pseudowhisper, and they will be constantly tempted to fall back on the artificial larynx if they have used one, but this again is no bar against learning to talk. Not every laryngectomized patient can learn to use the pseudovoice. It is most difficult for the aged, the unintelligent and those unwilling to do so. Physical frailty or cardiac weakness adds greatly to the difficulties. Mere age and frailty are not insurmountable barriers, however; one patient who took six months to learn to talk was a woman 71 years of age, who weighed 90 pounds, (40.8 Kg.), including her spectacles and dentures. From my experience, I can state without hesitation that of larygectomized patients only those who will not *try* will not learn the pseudovoice.

I turn now to other aspects of the rehabilitation of laryngectomized patients. It has been a source of surprise to me that many of the patients who must wear a tracheal tube have been dismissed by the laryngeal surgeon without full instruction in the care of the tube. Such patients, through ignorance or carelessness, come to me with the outer cannula foul, corroded and sharp on the lower end from friction, and with erosions or ulceration and granulation tissue in the trachea or about the cervical opening. One must be on the alert to see that the tube is removed, cleansed properly, polished and the end rounded over slightly, and that it really fits the wearer as the scar tissue contracts. Often the replacement of the usual no. 6 tube with a no. 8 will add greatly to the comfort of the wearer. Some find that a short hollow collar button sort of tube is all they require. From the foregoing comments it is apparent that if one can dispense with a tube of any sort by performing one of the newer technics with direct suture of the tracheal stump or of the split cricoid cartilage to the skin opening, much trouble will be saved the patient.

The patients must also be taught to take care of the tracheobronchial apparatus and lungs by protecting these against undue dryness and against dust in the air. All of them suffer more or less from chronic productive tracheobronchitis, because the nose has lost its protective function. They must learn to wear, especially in cold weather, a gauze apron, with or without a shield of screen material over the tracheal opening, one which extends well down over the anterior wall of the chest, so that they will breathe warm and moistened air. They must absolutely avoid dusty occupations, or pneumonoconiosis will result rapidly. They must be warned of the danger of the entrance of water into the tracheal opening; shower baths, bathing in full tubs and ocean bathing are forbidden. Two other precautions must be impressed on them. They must not try to clean the secretion from their tube or neck opening with small cotton or gauze swabs; one of these can be readily

aspirated into a bronchus by a sudden cough. They should use only large paper or gauze wipers. Again, oily medications of any sort should never be dropped through the tracheal tube or down the lumen of the trachea for the relief of dryness, crusting and thick secretions, at least not for any prolonged period. There is a real danger of producing acute or chronic pneumonitis of the lipoid type, because of the entrance of oil into the alveoli of the lung. This is illustrated by the roentgeno-

Fig. 8.—Roentgenogram of the thorax. The anteroposterior view of a laryngectomized patient with a permanent tracheotomy cannula, who for years had instilled liquid petrolatum into his trachea for the relief of cough. He suffered from chronic productive cough and dyspnea. The oil has become fixed in the tissues of the lower lobe of the right lung causing chronic lipoid pneumonitis.

gram of a patient who for years dropped liquid petrolatum into the trachea several times daily. He now has a chronic fibrotic process in the lower lobe of the right lung, with a definite chronic dyspnea and a productive cough, (fig. 8).

In conclusion, it is surely almost unnecessary to say that laryngectomized patients must be kept under surveillance at short intervals

for at least five years after operation. The otolaryngologist, with his ability to use the laryngeal mirror or direct laryngoscope, must ever be on the watch for local recurrences. In addition, there should be general physical examinations at regular if lengthening intervals, with roentgen examination of the chest under ideal conditions, to detect metastases at the earliest possible moment. This is the only hope of staying the progress of metastases, if there is any such hope.

SUMMARY

In the late postoperative period the laryngectomized patient is apt to suffer from mental depression because of the social and economic barriers and burdens imposed on him by total aphonia.

The best cure for this depression is a well guided attempt to learn to produce and use the pseudovoice.

The mechanism of such speech is simple. It can be learned by any patient of average intelligence and vigor if he tries patiently and is guided by an interested and sympathetic physician.

The advantages of the pseudovoice over any other substitute for the lost voice are numerous, and they are entirely practical. Life after the removal of the larynx for cancer cannot be the same as before. The laryngectomized patient must be guided, instructed, controlled and supervised for at least five years after the operation. The management of this physical and mental rehabilitation should rest in the hands of a practicing otolaryngologist.

39 East Fiftieth Street.

TUMORS OF THE LARYNX OTHER THAN SQUAMOUS CELL EPITHELIOMA

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This study is based on a series of unusual laryngeal neoplasms observed in the Mayo Clinic over a period of thirty years and includes a survey of the pertinent literature in English covering the same period. In this literature we found reports of 15 cases of sarcoma of the larynx, 3 of hemangioendothelioma, 1 of adenocarcinoma and 1 of myeloblastoma —a total of 20 cases of tumors of the types under discussion. In the past thirty years (to Dec. 31, 1939, inclusive) we have encountered 26 cases in which there was a malignant tumor of the larynx other than squamous cell epithelioma. Microscopic confirmation of the diagnosis has been obtained in each case. There were 11 cases of sarcoma (4 previously reported by Figi [1] and 2 by New [2]), 8 cases of hemangioendothelioma, 5 of adenocarcinoma, 1 case of melanoepithelioma and 1 case of myeloma.

New and Erich,[3] of this clinic, in discussing benign tumors of the larynx, stated that 722 benign and approximately 1,100 malignant tumors of the larynx had been examined here over a thirty year period. The period of their study nearly coincides with ours; consequently, a comparison of the two sets of figures can be made. This reveals that the ratio of all other types of malignant disease of the larynx to squamous cell epithelioma of the same structure is 1:44; also that the ratio of sarcoma to carcinoma is in the neighborhood of 1:100 rather than 1:11 to 1:25, as formerly believed. The ratio of all the remaining forms of malignant disease of the larynx to carcinoma is 1:78.

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From the Section on Laryngology, Oral and Plastic Surgery and the Section on Surgical Pathology, the Mayo Clinic.

1. Figi, F. A.: Sarcoma of the Larynx, Arch. Otolaryng. **18**:21-33 (July) 1933.

2. New, G. B.: Sarcoma of the Larynx: Report of Two Cases, Arch. Otolaryng. **21**:648-652 (June) 1935.

3. New, G. B., and Erich, J. B.: Benign Tumors of the Larynx: A Study of Seven Hundred and Twenty-Two Cases, Arch. Otolaryng. **28**:841-910 (Dec.) 1938.

SARCOMA

Figi has discussed sarcoma of the larynx in detail, emphasizing that "as a rule the neoplasms are pedunculated and they may be lobulated. Ulceration does not ordinarily develop, which is in contrast with the early ulceration commonly present in carcinoma of the larynx."

The lesion usually is

> more definitely localized than carcinoma in the same situation, and it manifests decidedly less tendency to infiltrate. Although the visible tumor of the former type is often much larger than that of many carcinomas of the larynx, the area of infiltration of the laryngeal structures is not nearly so extensive. On this account, even large tumors can often be removed through laryngofissure, whereas a carcinoma of apparently the same extent would necessitate laryngectomy. Metastasis also is longer delayed in cases of sarcoma, so that these growths remain operable considerably later than do epithelial tumors of the same degree of activity.

According to MacKenty,[4] lymphosarcoma is an exception to the foregoing statements. Of it he said that the "attack (is) . . . . deep-seated . . . . masked" and "may resemble slow chondritis."

The symptoms vary, depending on the size of the growth and its situation. As with many other tumors of the larynx, hoarseness is likely to be an early symptom. This may be the only symptom for a long time and may be intermittent or variable. Dyspnea seldom occurs early but may develop rapidly owing to sudden increase in the rate of growth of the lesion or to inflammatory reaction causing the lesion to swell. Pain, cough and dysphagia are symptoms only occasionally present.

A positive diagnosis is possible only on microscopic examination of tissue from the tumor. One must be suspicious, however, if clinical examination reveals a smooth pedunculated tumor and especially so if there is a history indicating that this has been enlarging rapidly. The treatment has been well summarized by Figi, who wrote:

> The treatment of sarcoma of the larynx depends on its size, situation and activity. Since many of these tumors are pedunculated, show less tendency to infiltrate the laryngeal structures and metastasize later than do carcinomas of the larynx, they may remain operable for a considerably longer period. Many of them are quite inactive and in an early stage may be removed readily by means of direct, indirect or suspension laryngoscopy. If such removal is followed by electrocoagulation of the attachment of the tumor, the prognosis will be good in many cases. If the tumor is too extensive to remove in this manner, laryngofissure or laryngectomy may be necessary. . . .
>
> Thyrotomy is especially useful in the treatment of sarcoma of the larynx, since many of the growths are pedunculated, and there is little tendency for them to cross either commissure to involve both sides of the larynx. Even though the tumor may be extremely large and completely fill the larynx and upper part of

4. MacKenty, J. E.: Malignant Disease of the Larynx, Arch. Otolaryng. **20**:297-328 (Sept.) 1934.

the trachea, it may on exploration be found to spring from a comparatively small pedicle with a well localized attachment, so that removal through laryngofissure can be carried out readily. In general, it would seem that the most conservative type of procedure permitting removal of the growth should first be carried out in cases of the more inactive types of neoplasm, as the records of cases of this type show that even when recurrence took place there was not sufficient activation to prevent removal by a somewhat more radical operation later, and the prognosis was apparently little affected.

Of the 11 cases of sarcoma of the larynx encountered at this clinic, the treatment was principally by surgical operation in 9 and by use of radium in 2. Eight patients are still living and free from recurrence. In 6 of the 8 cases the period of cure has been more than five years. Two patients died without recurrence after one and a third and five years, respectively. Only 1 patient died with recurrence.

Of the 11 tumors, 8 were diagnosed as fibrosarcoma (including fibromyxosarcoma), 2 as chondrosarcoma and 1 as rhabdomyosarcoma.

Although microscopically the tumors classified as fibrosarcoma varied considerably, the most common structure was that of sheets and strands of spindle-shaped cells, often arranged in compact bundles or whorls, with varying amounts of collagenous fibrils in and between the cells. The tumors were traversed by irregular thin-walled blood vessels, usually small and relatively few. The nuclei were for the most part spindle shaped or ovoid, with fine chromatin particles and small nucleoli, but in some of the tumors, especially in those diagnosed as fibromyxosarcoma, there were also many stellate cells with large spherical or irregular nuclei. In a few instances, tumor giant cells with multiple irregular nuclei were seen. The nucleoli were usually small and often indistinct.

The tumors were graded as to degree of malignancy in accordance with the method of Broders, which is based on the extent of differentiation of the tumor cells toward an adult functioning cell type. As Broders, Hargrave and Meyerding [5] pointed out, the amount of fibrogenesis in fibrosarcoma is in general proportional to the extent of differentiation, and this feature forms a basis for the grading of tumors of this type. In the fibrous types the number of mitotic figures also varies with the degree of malignancy, but the highly cellular spindle cell sarcoma is always extremely malignant, whether there be few or many mitotic figures. There are four grades of malignancy, grade 1 being the least and grade 4 the most malignant, with grades 2 and 3 of intermediate degrees of malignancy. In this group of 8 tumors diagnosed as fibrosarcoma, 3 were of grade 1, 2 of grade 2, 1 of grade 3 and 2 of grade 4 malignancy.

Of the 2 tumors diagnosed as chondrosarcoma, one was made up of groups of small triangular and lancet-shaped cells, with small hyper-

5. Broders, A. C.; Hargrave, R., and Meyerding, H. W.: Pathological Features of Soft Tissue Fibrosarcoma with Special Reference to Grading of Its Malignancy, Surg., Gynec. & Obst. **69**:267-280 (Sept.) 1939.

chromatic nuclei and fine cytoplasmic processes, widely separated by a clear pinkish hyaline stroma. The relatively well differentiated cells resembled cartilage cells, and mitoses were rare; the tumor was graded 1. The second tumor consisted of groups of large ovoid to lancet-shaped cells in a pale pinkish hyaline stroma, intimately associated with irregular masses and bundles of large irregular spindle cells, with large round or polygonal nuclei and hyperchromatic prominent nucleoli, and fine cytoplasmic and intercellular fibers. This tumor was diagnosed as fibrochondrosarcoma, grade 3.

The tumor which was diagnosed as rhabdomyosarcoma was composed of extremely irregular masses and poorly defined bundles of large irregular cells, intimately associated with fasciculi of striated muscle fibers and proliferated sarcolemma nuclei. The cells were extremely irregular in size, shape and arrangement, with large irregular hyperchromatic nuclei and often with multiple nucleoli. Mitotic figures were numerous; some were atypical. There were many tumor giant cells, some with single giant nuclei, others with multiple nuclei and some with large amounts of pale eosinophilic cytoplasm. Longitudinal striations were present in many of the cells, but cross striations were not seen.

HEMANGIOENDOTHELIOMA

Hoarseness was the outstanding complaint of 6 of the 7 adult patients we have seen who had hemangioendothelioma of the larynx. The hoarseness had been fairly constant and had been noted for periods varying from two months to two years. One patient complained only of a sense of tightness in the throat.

The remaining patient was an infant of 2 months, who was admitted to the hospital acutely ill with bronchopneumonia. The parents stated that the child had seemed to "breathe hard" before the onset of the pneumonia. Direct inspection of the larynx gave negative results. The child was too ill to permit further examination, and death occurred soon after admission. At necropsy a vascular tumor was found involving the under surfaces of both vocal cords.

The conditions observed on clinical examination in our cases of hemangioendothelioma of the larynx have not been such in any instance as to invite a suspicion of the true nature of the lesion. "Benign nodule," "fibrous-appearing nodule" and "polypoid-appearing nodule" are typical of the descriptive notes in the records.

Treatment in all but 1 instance has been by endoscopic removal, either by suspension laryngoscopy or by indirect laryngoscopy. In the instance excepted, the lesion was removed by indirect laryngoscopy, but after the pathologist's report had been received, thyrotomy was performed, in order to make certain of complete removal of the growth and to assure coagulation of the base of the wound.

Hemangioendothelioma is a lesion which is radiosensitive, and postoperative irradiation is recommended for its treatment.

Of the 7 adult patients in our series, 5 are living and have been free from recurrence for periods ranging from fourteen months to nine years. One patient died after fifteen months and is believed to have had a recurrence. One patient died after three years, of carcinoma of the stomach. The hemangioendothelioma did not recur.

Microscopically (fig. 1), the tumors diagnosed as hemangioendothelioma were characterized by the presence of numerous blood vessels, some complete, well formed and lined with normal endothelial cells,

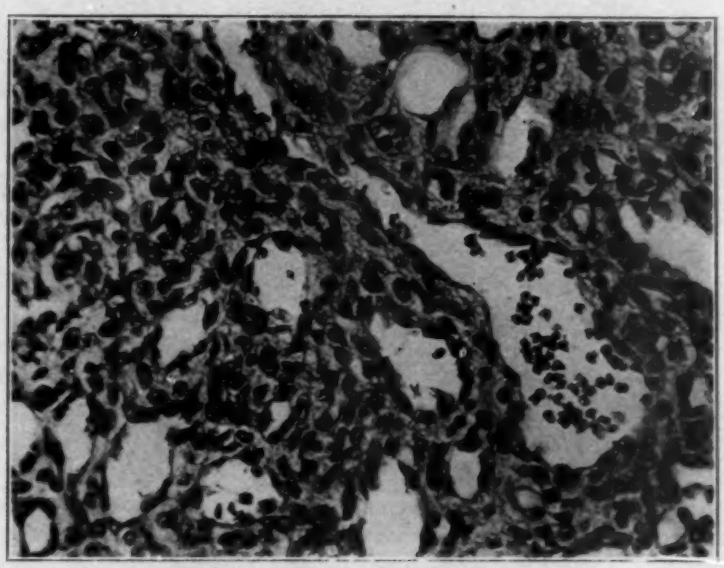

Fig. 1.—Hemangioendothelioma of the larynx, grade 1.

others incompletely developed or mere clefts within the tumor tissue and lined only by tumor cells. The tumor cells were usually spindle shaped or nearly round, with round or plump ovoid nuclei. In a given tumor the cells were usually nearly uniform in size and shape, although in some cases small portions showed considerable variation. Occasionally the cells were arranged in irregular bundles but more often in compact alveolar masses. Often they had a fair amount of pale eosinophilic cytoplasm, a distinct nuclear chromatin network and distinct deeply basophilic but small nucleoli. Some of the spindle cells contained fine fibrils, but as a rule there was little intercellular substance. In 2 tumors many of the blood vessels were surrounded by zones of clear eosinophilic hyaline connective tissue. Mitotic figures were seldom numerous but were present in every case. Most of the tumors were

of a low grade of malignancy: 6 were graded 1, 1 was graded 2 and 1 was graded 3.

ADENOCARCINOMA

Our experience with a group of 5 patients [6] who had adenocarcinoma of the larynx has been discouraging. In 2 patients the disease was hopelessly advanced when first seen by us. In 2 metastatic lesions appeared, one and four years, respectively, after apparently successful treatment of the primary lesion. Both these patients are dead. The remaining patient is well at the time of writing, two and three-fourths years after the removal of the larynx together with approximately 1 inch (2.5 cm.) of the upper end of the trachea.

In 4 of the 5 cases, the pathologist classified the lesion as adenocarcinoma, grade 1. The fact that a lesion of this type tends to be very slowly progressive explains the outstanding symptom, namely, hoarseness of long duration. In these 4 cases this symptom was described as follows: "progressive hoarseness for nine years"; "hoarseness for five years"; "hoarseness intermittent for years, continuous for two years"; "hoarseness for seven years." In each case dyspnea finally appeared, and this seems usually to have been the symptom causing the patient first to seek medical attention.

In the remaining case the lesion was of a more active type, being classified as mixed adenocarcinoma and squamous carcinoma, grade 4. As would be expected in view of the activity of the lesion, this patient's symptoms had been noted for a much shorter period than had those of the patients with grade 1 lesions. The patient had noted increasingly painful dysphagia for one year. The lesion was a pedunculated nodular mass, attached to the right aryepiglottic fold. Surgical removal was carried out, and the patient remained well for four years, when evidence of widespread metastasis appeared. Death occurred after another year. There was no local recurrence.

A consistent finding on examination in cases such as these is the presence of a firm nonulcerated tumor. The tumor may be nodular, and enlarged blood vessels may be visible over its surface. If the lesion is of long duration, it is likely not to be sharply localized.

Metastasis from low grade adenocarcinoma is not a frequent occurrence. This should be taken into account in considering the choice of treatment. We believe that radical surgical removal should be advised if evidence of metastasis is not present and if the tumor does not involve adjacent structures so as to make successful removal unlikely. Irradiation cannot be expected to be of much benefit in these cases.

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6. Since the preparation of this paper an additional case has been observed at the clinic and has been reported by New and Erich (New, G. B., and Erich, J. B.: Adenocarcinomas of the Larynx, Ann. Otol., Rhin. & Laryng. **50**:706-714 [Sept.] 1941). The patient was free from recurrence six months after the surgical removal of the tumor.

If and when biopsy is undertaken, one must remember that tumors of this type usually are covered with normal mucous membrane as well as by a fibrous capsule. It is necessary, therefore, to take special precautions to obtain a specimen from well within the tumor; otherwise the pathologist's report may not reveal the true nature of the lesion.

As has been stated, 4 of the 5 tumors diagnosed as adenocarcinoma were of grade 1 malignancy. Microscopically (fig. 2) there was marked evidence of differentiation, and the tumors were for the most part made up of well circumscribed cords and masses of epithelial cells, which in some places enclosed acinar spaces, usually containing mucus. The cells

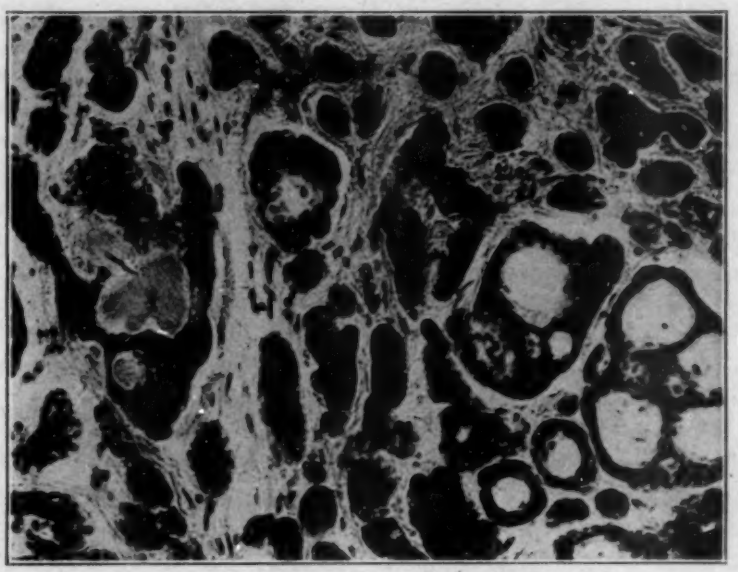

Fig. 2.—Adenocarcinoma of the larynx, grade 1.

were small and uniform, with round basophilic nuclei. There was a moderate amount of connective tissue stroma, which in several of the tumors showed areas of eosinophilic hyaline degeneration lying between the strands of tumor cells and producing the appearance of the so-called cylindroma type of tumor. Some of the tumors also had masses of small tumor cells of spindle shape which merged gradually with the surrounding stroma, resembling the structure of adenocarcinoma of mixed tumor type. Many of these tumors have features of both cylindroma and the mixed tumor type of adenocarcinoma and are difficult to classify in one group or the other. They are of slow growth and tend to increase by expansion, compressing surrounding structures, but, like the so-called mixed tumors of the salivary glands, they occasionally metastasize.

The fifth tumor in the group was of an entirely different nature, being composed for the most part of highly undifferentiated cells. Where evidences of partial differentiation were found, the cells were of varied type; in some places there were alveolar masses of cells with a few poorly formed acini, and in others there were layers and whorls of flattened or spindle-shaped cells of undifferentiated squamous type. Throughout the tumor most of the cells were large, with large, deeply basophilic, vesicular nuclei and prominent nucleoli. They were arranged for the most part in diffuse, poorly circumscribed masses, in many places in intimate contact with irregular thin-walled blood spaces, a pattern which suggests the probable mode of occurrence of the widespread metastatic growths which later became manifest. This tumor was diagnosed as combined adenocarcinoma and squamous cell carcinoma, grade 4. (This was a single tumor with two types of cell differentiation, not 2 tumors.)

MELANOEPITHELIOMA

A man of 48 years came to the clinic complaining of a sense of irritation in the throat of one year's duration. There was a malignant-appearing, dark brown mass in the right hypopharynx, arising from the right arytenoid cartilage. Microscopic examination of tissue from the mass confirmed the clinical diagnosis of melanoepithelioma.

Because there was evidence of widespread metastasis, treatment was considered to be futile, and none was given. We have no information as to the subsequent course of events.

Melanoepithelioma (formerly classified by most pathologists as melanosarcoma) is exceedingly difficult to control, regardless of the site of its appearance. This is because of its marked tendency to give rise to early and widespread metastasis.

The treatment of melanoepithelioma of the larynx need not differ from that of any other type of active malignant lesion except that if one encounters a small lesion the appearance of which definitely suggests this diagnosis, a procedure should be selected which will permit of wide removal of the lesion and thorough cauterization of the wound at the same time. Biopsy of such a lesion, which possibly has not yet given rise to metastasis, is, we believe, contraindicated. Postoperative irradiation, both of the site of the local lesion and of the regional lymph nodes, is advisable.

Although melanoepithelioma, or "malignant melanoma," does not commonly arise in mucous membranes, nevertheless it has been reported in various parts of the alimentary canal, from palate to rectum, as well as in the nares, the pharynx and the larynx. Microscopic examination of the single tumor diagnosed as melanoepithelioma in this study revealed strands and alveolar masses of moderately large polyhedral cells with palely eosinophilic granular cytoplasm, round or polygonal basophilic

nuclei and usually small nucleoli. Many of the tumor cells, especially near the periphery of the alveolar masses, contained fine granules of melanin in the cytoplasm. Moderately large, irregular blood spaces, intimately associated with the tumor cells, were fairly frequent.

MYELOMA

A man of 62 years came to the clinic because of hoarseness of eighteen months' duration. A firm nodular mass 2.5 cm. in diameter was found attached by a narrow base to the left aryepiglottic fold. Under suspension laryngoscopy, the tumor was excised, and the base of the wound electrocoagulated. The pathologist classified the lesion as plasma cell myeloma. The site was irradiated postoperatively. At the time of writing the patient remains in excellent health with no evidence of recurrence after four and a half years.

After the pathologist's report had been received, the patient was examined further for evidence of Bence Jones proteinuria and by roentgenograms of the long bones for evidence of other tumors. These examinations gave negative results.

In various soft tissues, most frequently in lymphoid tissue or in mucous membrane overlying lymphoid tissue, there occur certain tumors, usually solitary, composed of a diffuse growth of more or less differentiated plasma cells, resembling in gross and microscopic structure multiple myeloma, or plasma cell myeloma, of bone marrow. The tumor of this type found in the present series was composed of diffuse solid masses of cells of the plasma cell type, infiltrating practically all the tissues up to the basal layer of the covering epithelium. There was little stroma except for a moderate number of blood vessels traversing the tumor, some of which were surrounded by hyaline eosinophilic degenerating connective tissue. The tumor cells were fairly uniform in size, slightly larger than the normal differentiated plasma cell, with clear cytoplasm, inconspicuous nucleoli and fairly large, uniform, nearly spherical eccentric nuclei with large deep-staining regular blocks of chromatin distributed uniformly about the periphery and through the center of the nucleus in typical "checkerboard" pattern. Mitotic figures were infrequent. The cells of tumors in this group appear to be closely related to lymphocytes, and by some pathologists the tumors are classified as lymphosarcoma.

COMMENT

In a series of approximately 1,100 cases of malignant disease of the larynx, we have found that for each 44 cases of squamous carcinoma there was 1 case in which some other type of malignant disease was present. Although the treatment of other types of malignant disease of the larynx should follow the same general principles as those laid

down for the treatment of carcinoma, there are certain important points to be borne in mind. Sarcoma of the larynx is likely to be found amenable to treatment by conservative operation and to offer a good prognosis. Adenocarcinoma of the larynx may become very extensive before it is recognized but may be curable by radical surgical treatment in spite of this. Hemangioendothelioma responds well to treatment by removal and irradiation of the site. Melanoepithelioma and myeloma of the larynx may be classified as medical curiosities. The former is likely to be incurable, but the latter should respond well to appropriate treatment.

ALLERGIC RHINITIS

ANALYSIS OF ONE HUNDRED AND TWENTY-EIGHT CASES IN WHICH THE RHINOLOGIST AND THE ALLERGIST COLLABORATED

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A considerable number of the patients seen by the rhinologist have allergic rhinitis. It seems axiomatic that such patients ought to be treated by methods currently employed by the allergist. To treat them thus, the rhinologist should familiarize himself with acceptable allergic practices or he should collaborate with an allergist. To ignore, ostrich-like, the presence of allergy, or to attempt to treat the rhinologic manifestations of allergy by orthodox rhinologic procedures is indefensible. Conversely, it is equally indefensible for the allergist to ignore the necessity for orthodox rhinologic treatment of those allergic patients who present one or more of the several complications of allergic rhinitis. The literature referable to the role of the rhinologist in the management of allergic rhinitis has been reviewed in detail recently by Vaughan.[1]

The allergist and the rhinologist have reported their results separately. No report has been found which outlines a method of management and attempts to evaluate the effectiveness of all the procedures employed by the allergist and the rhinologist in collaboration. This report is based on an analysis of data obtained from the records of 128 consecutive private cases in which the allergist and the rhinologist collaborated in the treatment of patients with allergic rhinitis. In general our chief criticism of previous studies would be that they attempt to emphasize the effectiveness of rhinologic versus allergic management.

DIAGNOSIS

The typical allergic manifestations of sneezing, rhinorrhea, stuffy nose, lacrimation, itching of ears and pharynx, pale, edematous, boggy condition of the mucosa, with or without polypoid degeneration, and a

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Read before the Section on Laryngology, Otology and Rhinology at the Ninety-Second Annual Meeting of the American Medical Association, in Cleveland, June 5, 1941.

1. Vaughan, W. T.: Practice of Allergy, St. Louis, C. V. Mosby Company, 1939.

preponderance of eosinophils in the secretions are well known. Typical infectious rhinitis differs markedly from allergic rhinitis. These differences have been well summarized by Cohen and Rudolph.[2] When the findings are not typical, the following statements by patients are highly suggestive of allergic rhinitis: "I take one cold after another." "I keep a cold all the time." "I will sneeze if you look at me." "I take cold when I sit in a draft," "get caught in the rain" or "get chilled." Other observations suggesting allergic rhinitis in the patient with nasal symptoms are: absence of malaise, easy fatigue, fever or purulent discharge with colds; a preponderance of symptoms during one part of the day and relative comfort at other times; recovery from a "cold" in one or two days; habitual rubbing of the nose or eyes; chronic nasal symptoms without other obvious causes.

Nasal smears for eosinophils, as advocated by Hansel[3] and others, are seldom necessary if the history and the examination of the nose are properly evaluated. There are borderline cases which require the application of all available diagnostic criteria. However, in the average case the recognition is easy and simple.

CLASSIFICATION

Once the diagnosis of allergic rhinitis is established, it is desirable to classify the case on the basis of nasal and paranasal complications, if present.[4] By the application of routine rhinologic diagnostic criteria, our 128 cases were divided into seven groups as follows:

Vasomotor rhinitis	Cases
(1) with no, or negligible, complications	61
(2) with obvious obstruction from septums or turbinates and secondary chronic ethmoiditis	25
(3) with obstruction from polyps	16
(4) with pansinusitis and marked mucosal degeneration	9
(5) with chronic maxillary sinusitis	9
(6) with acute or subacute maxillary sinusitis	9
(7) with obstruction from septums or turbinates without secondary infection	4

We object to too close adherence to the common classification into intrinsic and extrinsic allergic rhinitis. Many cases of so-called intrinsic allergic rhinitis are so classified because the efforts of the allergist have simply failed to identify a primary extrinsic allergen.

2. Cohen, M. B., and Rudolph, J. H.: Allergic and Infectious Conditions of the Upper Respiratory Tract in Children, J. A. M. A. **97**:980 (Oct. 3) 1931.

3. Hansel, F. K.: Observations on the Cytology of the Secretion in Allergy of the Nose and Paranasal Sinuses, J. Allergy **5**:357 (May) 1934.

4. Cooke, R. A., and Grove, R. C.: Relation of Asthma to Sinusitis, with Special Reference to Results from Surgical Treatment, Arch. Int. Med. **56**:779 (Oct.) 1935.

ETIOLOGIC DIAGNOSIS OF ALLERGY

The chief function of the allergist is to identify and then to protect the patient from the effects of offending allergens. There are two chief methods at his command, the history of the allergy and skin testing. At time he also uses various eliminative procedures, conjunctival and nasal insufflation tests, and thermal tests for physical allergy.

It should be emphasized that in the 128 allergenic histories (table) 109 patients recognized that one or more inhalants precipitated bouts of hay fever or asthma. Forty patients recognized symptoms from one or more foods; 93, from one or more physical agents, and 23 from respiratory infections. By comparison, 109 patients (table, part C) had positive skin reactions to one or more inhalants, 96 to one or more foods, and 63 to bacterial vaccines. The minimal routine consists of 64 cutaneous and 98 intracutaneous tests. These figures indicate clearly that the allergenic history compares favorably with the skin tests as a source of etiologic leads. All such leads obtained by any method must be verified clinically by trial and error. These figures also illustrate the fact that multiple etiologic allergens are the rule and not the exception.

CONSERVATIVE VS. SURGICAL TREATMENT

After the complications have been classified, surgical procedures can be included tentatively or excluded definitely from the plan of treatment. Obviously, a major surgical operation is not required for those with allergic rhinitis and negligible complications, those with uncomplicated polyposis or with acute or subacute maxillary sinus infections. Allergic management plus simple excision of polyps or lavage of the maxillary sinuses is sufficient. On the other hand, patients are at least potential candidates for major surgical operations when they have allergic rhinitis plus obstruction to ventilation and drainage, or chronic sinusitis or bronchiectasis.

Distant as well as paranasal complications must be evaluated. Asthma and bronchiectasis are the two most important. Seventy-four of the 128 patients had asthma, and 16 had bronchiectasis (table, part A); all but 1 of the 22 patients with acute, subacute or chronic sinusitis had asthma. All the patients with bronchiectasis had sinusitis. This emphasizes the importance of adequate treatment of sinus infections complicating allergic rhinitis. It is interesting that asthma began coincidentally with allergic rhinitis in 20 of the 74 patients and followed it in 37. In only 17 did asthma precede rhinitis. These figures indicate the importance of the treatment of allergic rhinitis as a prophylactic measure for asthma.

In determining the need for a major surgical operation, the prime questions to be asked are: How much of the disability is due directly to the allergic rhinitis? How much is due to obstruction? How much

Summary of Data on One Hundred and Twenty-Eight Patients with Allergic Rhinitis

	Patients with Vasomotor Rhinitis Plus							
	Negligible Complications	Obstruction from Septums or Turbinates and Chronic Ethmoiditis	Obstruction from Polyps	Pansinusitis	Chronic Maxillary Sinusitis	Acute and Subacute Maxillary Sinusitis	Obstruction from Septums or Turbinates Alone	Total
Patients	61	25	16	9	9	4	4	128
A—Complications								
Asthma	30	14	7	8	9	4	2	74
Priority of vasomotor rhinitis	15	7	5	3	4	1	2	37
Priority of asthma	7	4	0	3	1	2	0	17
Coincidence of onset	8	3	2	2	4	1	0	20
Polyps	13	17	16	8	6	3	2	65
Sinusitis	12	19	6	9	9	4	1	60
Bronchiectasis	2	2	0	7	4	1	0	16
B—Positive History of Precipitating Factors								
Inhalants	52	20	12	7	8	4	4	109
Foods	18	7	4	5	4	1	1	40
Physical agents	42	18	11	8	8	4	2	93
Respiratory infections	7	9	0	5	2	0	0	23
C—Positive Skin Reactions								
Inhalants	56	17	14	8	7	4	3	109
Foods	54	10	12	9	6	3	2	96
Bacterial vaccines	30	8	8	7	6	2	2	63
D—Treatment								
Symptomatic	61	25	16	9	9	4	4	128
Inhalant avoidance	54	19	13	9	5	4	4	108
Food avoidance	43	17	10	7	5	2	4	88
Hyposensitizing injections	32	14	7	8	4	2	4	71
Major surgical operation	0	25	0	9	9	0	0	43
E—Analysis of Questionnaires								
Replies 44	..	19	9	5	5	1	6	89
Nasal symptoms Yes 31	..	14	9	4	4	1	4	67
No 9	..	4	0	1	0	0	2	16
Cough Yes 10	..	3	6	5	2	0	0	26
No 30	..	13	3	0	1	1	4	52
Wheezing Yes 10	..	7	3	5	4	0	0	29
No 29	..	9	6	0	1	1	4	50
Susceptibility to colds Yes 8	..	7	4	2	3	1	0	25
No 31	..	10	4	3	0	0	4	52
F—Estimated Improvement								
100%	6	3	0	0	0	0	1	10
90%	16	6	5	1	0	0	0	28
75%	9	2	2	2	3	1	1	20
50%	11	4	2	1	0	0	0	18
Negligible or worse	2	4	0	1	2	0	2	11
G—Therapy Responsible for Improvement								
Food avoidance	14	2	3	3	0	1	0	18
Inhalant avoidance	10	2	1	2	0	1	0	16
Dust proof mattress and pillow cases	13	3	3	0	0	1	0	20
Hyposensitizing injections	17	9	2	2	0	0	2	32
Surgical treatment	0	12	9	4	2	1	0	28
Change of environment	5	0	0	0	0	0	0	5
Pregnancy	1	1	0	0	0	0	0	2
Symptomatic treatment	9	0	2	3	1	1	0	16
H—Probable Causes of Failure of Therapy (50% Improvement or Less)								
Advice not followed	3	2	0	0	2	0	2	9
Desultory cooperation	7	2	1	1	0	0	0	11
Failure of therapy	3	1	1	..	0	0	0	5
Incomplete surgical intervention	0	0	0	..	0	0	1	1
Lung abscess	0	0	0	1	0	0	0	1

is due to infection? How much is reflex? Is the allergic reaction due to bacterial sensitization (intrinsic) or to extrinsic allergens? How much damage of tissue has taken place, and can normal function be restored by conservative means? These questions are not always easily or accurately answered.

In general, we feel that a period of allergic management plus conservative rhinologic treatment should precede major surgical intervention. In those few patients with a history of long-standing severe asthma, bronchiectasis, and physical and roentgenologic evidence of chronic sinus infection, little is to be gained by the postponement of surgical intervention. When a major surgical operation is necessary, it should be complete enough to effect a cure of the complications which necessitated it. A major surgical operation was not indicated in 81 (63 per cent; table, parts A, C and F) of the 128 patients. Obstructions and secondary ethmoiditis required intranasal surgical treatment in 25 (19 per cent; B). Advanced nasal complications required external operations in 18 (14 per cent; D and E). Operations were advised but not done in 4 (3 per cent; G). These figures from 128 cases cannot be expected to establish the average incidence of conservative versus surgical treatment of allergic rhinitis.

TREATMENT

The treatment of the allergic manifestations and their complications consisted (table, part D) of the avoidance of inhalants suspected and proved to be contributory (108 cases) and foods (88 cases), minor surgical procedures (20 cases) and major surgical procedures (43 cases), hyposensitizing injections (71 cases) and the use of symptomatic remedies (128 cases).

Follow-Up.—To evaluate the results of combined allergic and rhinologic treatment a questionnaire was sent to each of the 128 patients; 89 replied (table, part E). Sixty-seven were still having nasal symptoms, but 58 (table, part F) were from 75 to 100 per cent improved; 18 were 50 per cent improved, while 1 reported less than 50 per cent improvement. The follow-up period for all of these patients was six months or longer.

In the questionnaire, the patients were asked to indicate the therapeutic procedure they thought responsible for their improvement. Seventy-six attributed improvement to nine therapeutic procedures 139 times (table). Chief among the effective therapeutic procedures were: hyposensitizing injections in 32, dust-proof mattress and pillow cases in 20, major surgical operation in 18, minor surgical procedure in 10, avoidance of foods in 18, avoidance of inhalants in 16, symptomatic remedies in 16, change of environment in 5, pregnancy in 2 (not pre-

scribed). The same pitfalls apply to the acceptance of the results of this questionnaire which apply to the acceptance of the results of any questionnaire.

Reasons for Failure.—Of the 89 who replied, the 58 who were improved from 75 to 100 per cent were considered to have had satisfactory results. The records of the 18 who were improved 50 per cent and of the 11 who were negligibly improved were reviewed (table, part H) to determine the cause of these unsatisfactory results. Nine made no attempts to follow any advice given. Eleven cooperated in a very desultory manner and did not approximately complete the program outlined after the initial study. No alibi could be found for 5 whose replies indicated therapeutic failure. For 1, operation was advised but not done. In 1 with bronchiectasis a lung abscess developed. Two with negligible nasal symptoms estimated their asthma as only 50 per cent improved. The latter belonged rhinologically in the satisfactorily improved group.

SUMMARY AND CONCLUSIONS

The records in 128 consecutive private cases in which an allergist and a rhinologist collaborated in the treatment of patients with allergic rhinitis have been analyzed. A table provides a summary of the classification of the cases, complications, etiologic factors ascertained by questioning and by skin tests, methods of treatment, degrees of improvement, therapeutic measures responsible for improvement and probable causes of failure of treatment.

This analysis suggests the following recommendations:

The etiologic factors of allergic rhinitis and the character of the complications necessitate using both rhinologic and allergic methods of diagnosis and treatment. This can be done only by collaboration between the allergist and the rhinologist or by the rhinologist who is competent in dealing with allergy.

After the clinical diagnosis has been made, the case should be classified on the basis of the presence and the type of paranasal complications. Patients with no or negligible complications, simple mucous polyps and acute or subacute sinusitis should be treated by allergic practices plus conservative rhinologic procedures.

Patients with chronic maxillary or chronic pansinusitis, with obstructive turbinates or septums, plus chronic ethmoiditis, especially if they have asthma or bronchiectasis, are at least potential candidates for surgical treatment. In general, a comprehensive program of allergic therapy plus conservative rhinologic procedures should precede major surgical intervention. When a surgical operation is done, it should be complete enough to cure the complications of allergic rhinitis which necessitated the operation. In general, surgical treatment is not supposed to cure the allergic rhinitis.

ABSTRACT OF DISCUSSION ON PAPERS BY DR. HANSEL AND DRS. WOODWARD AND SWINEFORD

DR. GRAFTON TYLER BROWN, Washington, D. C.: After listening to these interesting papers by Dr. Hansel and Drs. Woodward and Swineford, I feel that I can make no better use of the brief time at my disposal than by discussing the recognition of allergic rhinitis and adding a few words regarding treatment.

The first step is the painstaking elicitation of the history. An allergy-minded physician can frequently make the diagnosis of allergic rhinitis from the history alone. The allergic constitution is inherited in at least half of the cases, so that a history of asthma, hay fever, eczema, migraine, urticaria or angioneurotic edema in the family increases the likelihood that the rhinitis is on an allergic basis. Sensitization is usually multiple, and a person with one allergic disease tends to acquire sooner or later other allergic symptom complexes; therefore, a past or a present personal history of other allergic manifestations is strong evidence that the nasal symptoms may also be due to allergy.

Allergic rhinitis is characterized by itching and irritation of the nose, paroxysmal sneezing and profuse rhinorrhea, alternating with periods of partial or complete nasal stoppage. The bouts of excessive sneezing occur with the slightest provocation, such as getting out of bed in the morning, touching the bare feet to the cold floor, exposure to sudden changes of temperature or drafts. Any person who sneezes ten or more times in rapid succession is usually allergic. The nasal secretion is frequently sufficient in quantity to wet an incredible number of handkerchiefs or disposable tissues during the day. This secretion is a thin, clear, colorless, watery one, which does not stain the handkerchief but stiffens it when it dries.

The sneezing and running of the nose are commonly worse in the morning, whereas the nasal obstruction is more likely to occur at night. The nasal symptoms of allergic rhinitis are usually accompanied by ocular symptoms consisting of itching, burning, lacrimation and redness of the conjunctivas. Definite itching of the eyes, particularly of the inner canthus, is almost pathognomonic of sensitization to some air-borne substance. Itching of the eyes and nose is frequently accompanied by itching far back in the roof of the mouth and deep in the ears. These patients may give a history of frequent "colds," when the trouble is not "colds" at all but merely reactions of the sensitive mucous membranes to some allergenic substance. If during the course of the history, it can be elicited that house dust, certain foods, plant pollens, animal epidermal substances, drugs, cosmetics, insecticides, poultry feed or other substances produce or aggravate the nasal symptoms, a strong case is built up for allergy.

Examination of an uncomplicated allergic condition of the nose reveals a pale, bluish gray, edematous or water-logged mucous membrane, strikingly different in appearance from that of a nose affected by bacterial infection or that of a normal nose. I have observed at times an accompanying pallor of the soft palate. Of course, when bacterial infection is superimposed on allergy to some air-borne substance or food, the nasal appearance loses some of its characteristic features.

Nasal smears taken during an attack show eosinophilia, which in my experience has been an invaluable aid in establishing the diagnosis of allergy in some of these cases. To obtain secretion for the nasal smears I insert a small cotton swab in the nostrils, and when this gentle procedure provokes explosive sneezing I feel reasonably certain that I am dealing with an allergic nose. In some patients an abundance of eosinophils can be observed at once; in others it is necessary to

make nasal smears on several occasions before eosinophilia can be demonstrated. Blood eosinophilia and a low sedimentation rate supply additional evidence of allergy. I should like to emphasize that nasal eosinophilia does not necessarily mean allergy to inhalants or ingestants, as the same condition occurs in bacterial allergy, and in fact some of the highest eosinophil percentages that I have encountered in blood and nasal smears have been those in cases of bacterial allergy.

Positive reactions to skin tests with one or more allergenic substances supply the final link in the diagnostic chain. In an occasional case, ophthalmic or intranasal tests are resorted to. This is a job for the well trained allergist. The purchase of a commercial skin-testing set does not make one an allergist any more than installing an x-ray machine transforms an ordinary physician into a radiologist.

The treatment of allergic rhinitis is essentially antiallergic and nonsurgical. All offending allergens should be eliminated from the environment and the diet. When such avoidance is impracticable or is incomplete, specific hyposensitizing or desensitizing injections must be instituted and continued for a considerable period. Many of these patients are subjected to unnecessary and repeated surgical procedures, which do more harm than good, as the vasomotor reaction and scar tissue seldom mix well. Of course, polyps that cause nasal obstruction or interfere with ventilation and drainage of the sinuses should be removed by the rhinologist, and abscessed antrums should be punctured and irrigated. There should be more collaboration between the rhinologists and the allergists than generally exists today.

DR. J. ALEXANDER CLARKE JR., Philadelphia: I have no serious objection to anything that was contained in these two papers.

As for Dr. Hansel's paper, it seems to me he has made the problem a little too simple. My associates and I do have patients who respond as easily as Dr. Hansel's selected group, but we encounter others whose treatment is more difficult. Further, in my experience the eosinophils are not found as consistently or as easily as Dr. Hansel says, although I have to confess that my enthusiasm for eosinophil hunts ceases long before the twelfth nasal smear.

I am glad that Dr. Hansel brought out the atypical forms of nasal allergy. Many of these are often much easier to treat successfully than is such a simple allergy as hay fever.

As to the paper presented by Drs. Woodward and Dr. Swineford, my only objection is that I do not believe that asthma precedes nasal allergy as frequently as they have said. A more detailed history would disclose some of the atypical forms of nasal allergy preceding the onset of asthma.

Allergy is a disease of the entire respiratory tract. In approximately 10 per cent of the persons complaining only of nasal symptoms we find musical rales in the lung. Another 10 per cent in a careful taking of the past history will mention considerable bronchial trouble, such as cough. I should like to ask rhinologists to refer their patients to the allergist or the internist as soon as any bronchial symptoms appear.

It is usually possible to make the diagnosis of asthma three months to a year before the patient is so severely asthmatic as to need epinephrine, and it is during this period that we, as allergists, would like to start our treatment. I usually end these pleas for early treatment by citing the case of a little boy who was first seen by his family physician in the middle of the night. He had to give him an injection of epinephrine hydrochloride to relieve his dyspnea. I saw the boy the next day. His chest was full of musical rales, and I had to give him more epinephrine hydrochloride. The boy moved to Detroit. Fifteen years later, in preparing a report on a series of cases of asthma in childhood we wrote to the child's

father and received a very nasty letter from him. He said that he didn't feel that the boy had ever had asthma; he hadn't had a bit since he came to Detroit, and he felt that the year and a half of treatment at my office was nothing but a "bunk game."

DR. T. C. GALLOWAY, Evanston, Ill.: This paper of Dr. Woodward and Dr. Swineford is important in emphasizing especially that due consideration must be given to the question of allergy before any surgical treatment is considered. I think it is important to recognize that surgical intervention is indicated for patients with as well as for those without allergy, and the indications are roughly the same, except that when there is a demonstrated bacterial allergy, surgical intervention is much more important. In addition, the patient in whom obstruction persists after allergic treatment should not be denied the not infrequent marked relief from a submucous resection or adenoidectomy.

I will agree with the allergist that frequently allergy is made worse by the removal of tonsils and adenoids, and the indications for surgical intervention must be quite positive before one removes tonsils and adenoids in an allergic child.

The authors' percentage of operations in cases of allergy seems higher than my own, and I was surprised at the percentage of external operations.

It is easy to be confused as to the relation between nasal allergy and infection and pulmonary involvement. It is more logical to assume that allergic rhinitis is caused by the same allergens that cause an associated asthma, as Dr. Clark emphasized, than it is to believe that the former causes the latter. It is agreed also that a patient is predisposed to nasal sinusitis by nasal allergy and likewise that he is predisposed to bronchiectasis by allergy, as shown by Kibler, Piness and others. It does not necessarily follow that the sinus infection causes or perpetuates bronchiectasis or that bronchiectasis constitutes a special indication for operation on the sinuses. We have assumed that for a long time, but I am not quite sure on what grounds. Perry and King found that in less than 6 per cent of their series of cases of bronchiectasis was there an extension of bronchiectasis after the first observation.

It seems to me that the explanation of bronchiectasis is to be found in a single obstructive episode probably with atelectasis, pneumonitis, bronchial damage, perhaps lung abscesses and bronchiectasis. The ideal condition for that to occur would be found in the allergic child with edematous mucosa, bronchiospasm and tenacious plugs, although of course it can occur following tracheobronchitis, atypical pneumonia, other infections, foreign body involvement and many other conditions.

As to Dr. Hansel's paper, I am in thorough agreement with him as to the importance and the frequency of allergy. I think it should be recognized that this condition more frequently leads to the patient's complaint of "sinus disease" than sinus disease itself. I would quarrel only a little with Dr. Hansel's use of the term "atypical allergy." When rhinologists first begin to get acquainted with allergy, it all looks atypical except the typical hay fever, but as they come to know more about it they will recognize that its very protean manifestations are part of a typical picture of allergy and they will not call so much of it atypical.

DR. GEORGE PINESS, Los Angeles: Dr. Hansel has made a definite contribution to the members' knowledge of allergy in his extensive work with the cell composition of nasal secretions and the importance of eosinophils. I wish to express this thought to you that comes to me through an expression once made by Dr. Chevalier Jackson, who said that all that wheezes is not asthma; I wish to say too that all eosinophils found in the nasal secretions do not necessarily indicate allergy, because there are many other conditions that would present eosinophilia in the nasal secretions and in the blood that do not have an allergenic origin.

A recent epidemic of trichinosis demonstrated this fact very definitely: A young woman who was referred because of so-called allergic rhinitis, with all the characteristic symptoms, such as edema of the nasal mucosa and subcutaneous tissue about her eyes, gave a history which justified the suspicion of some other cause of her illness. Although there were eosinophils in the nasal smear and a marked increase in eosinophils in the blood, the history again indicated some other factor as the cause of her condition, which proved in this case to be trichinosis instead of an allergy.

I feel that there is too much emphasis and importance laid on the routine nasal smear and the fact that eosinophils may be present. As a matter of fact, there is not a single allergist or otolaryngologist who would refuse to treat a patient whom he believed to have an allergic condition of the nose, even if the nasal smear were negative many times.

Dr. French K. Hansel, St. Louis: I have placed a great deal of emphasis on cytologic studies chiefly with the idea of correlating the findings with the symptoms, the nasal changes and other factors. I do not feel that everything depends on the cell picture. Certainly in our experience it has been a very valuable procedure, particularly in distinguishing between an allergic exacerbation and a cold, and often it is difficult or almost impossible to determine by simple physical examination what the cytologic picture may be. The instance in which I took twelve nasal smears before finding the eosinophils was an exception to the rule.

The point I want to bring out is that in some of these borderline cases it is a question of whether the patient is or is not allergic, and I think in some instances one has to depend on cytology to make an accurate diagnosis.

It has been our experience that rarely do we find nasal eosinophilia due to other conditions. It may occur in trichinosis or other parasitic disease; however, it has been shown that in these diseases often urticaria occurs and that skin tests have shown positive reactions to the extracts of these various parasites, so there still remains the possibility that the patient may become sensitive to protein from this source.

Dr. Oscar Swineford, Charlottesville, Va.: There are two things that I should like to call to your attention. One is that a working knowledge of allergy seems to be less widely spread than is a working knowledge of other branches of medicine. One reason is that instruction in allergy in medical schools in this country is limited. In 1936 there were actually no allergists or allergy clinics in fourteen of the recognized schools in this country. In twenty-two schools the instruction in allergy was decidedly haphazard.

The second point is about the history of allergy. It takes a long time to get the detailed information necessary to proper management of the allergic patient. We allow about an hour to each patient for the history of allergy alone.

In reply to Dr. Clark, it is a fact that 17 patients did have asthma before they had any nasal symptoms whatever.

USE OF IODIZED OIL IN THE TREATMENT OF INFECTIONS OF THE NASAL ANTRUM

HENRY M. GOODYEAR, M.D.
CINCINNATI

My first experience in the use of iodized oil was in 1925, when I used this material as an opaque contrast medium in the making of roentgenograms of the maxillary and sphenoid sinuses. At that time patients occasionally volunteered that their condition was much improved after roentgenograms were made. I suspected that it was the oil which had helped them and ventured the assertion that iodized oil was of some medicinal value in the treatment of infections of the nasal sinuses.[1]

I later observed that I was getting better results when oil was used in the sinuses than I had obtained by irrigation or by the use of alcohol or many of the antiseptic solutions which I had tried in the treatment of acute and subacute infections of the antrum. I soon learned that the injection of 2 cc. of iodized oil into the antrum at intervals of a week or ten days accomplished much more than frequent irrigation.

Every infection of the antrum is accompanied by some infection of the ethmoid cells, and it was soon noted that treatment of the antrums with iodized oil was of the greatest aid in clearing the accompanying infection of the ethmoid cells. Experimentally, it was evident that oil placed in the antrums would be found in the frontal sinuses and the ethmoid area shortly after injection, depending on the position of the head. In June 1930 I presented before this society pictures showing the results of these experiments.[2]

I have tried a number of dilutions with various oil mediums and have come to regard 27 per cent iodized and 7.5 per cent chlorinated peanut oil as the most satisfactory in my hands, 2 cc. being the average amount used in each antrum.

In most of my cases the oil is injected by means of a double curved cannula, through the normal ostium. If this cannot be accomplished, a straight needle is used under the inferior turbinate (fig. 1).

Read before the Section on Laryngology, Otology and Rhinology at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 4, 1941.

1. Goodyear, H. M.: Iodized Oil in the Diagnosis of Nasal Sinus Conditions, Arch. Otolaryng. **4**:223-227 (Sept.) 1926.

2. Goodyear, H. M.: Use of Iodized Oil in Diagnosis of Nasal Sinus Conditions: Further Observations, J. A. M. A. **95**:1002-1006 (Oct. 4) 1930.

Here I wish to emphasize the care which must be used in selecting a double curved cannula if one is to be successful in using the normal ostium for the injection of oil. If the cannula is even 1 mm. greater in diameter than the one pictured here (fig. 1), the number of successful entries into a normal ostium will be reduced to a surprising degree.

IRRIGATION OF THE ANTRUM

I have no quarrel with the occasional irrigation of an antrum in which there is an acute infection and in which the pus is heavy and difficult to remove, but after every irrigation some water remains in the antrum and, mixed with some pus and infective material and incubated at body temperature, serves as an excellent medium for the growth of any organisms which are present. It is only rarely that I feel that an irrigation is necessary.

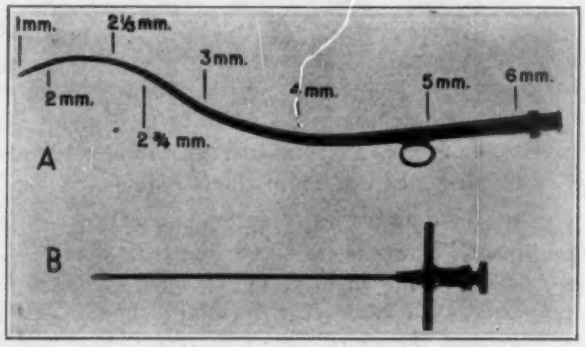

Fig. 1.—Instruments used, with Luer fittings: (*A*) double curved cannula for filling the antrum through the middle meatus, which may be bent to a more acute curve if desired; (*B*) straight 17 gage needle for use in the inferior meatus.

Injection of Oil After Irrigation.—If an irrigation is performed, I inject the iodized oil immediately, before the cannula is removed. One may argue that the oil will float on top of the water which remains in the antrum and thus be ineffective. This is not the case, however, as iodized oil is heavier than water and sinks to the bottom, helping to displace the water, as can be demonstrated easily in vitro or by roentgenograms made after irrigation and the injection of oil (fig. 2).

ACUTE INFECTION

It has been my plan not to irrigate or make injections into antrums with acute infection until four or five days after the onset of the infection unless the pain over the antrum is unduly severe. I believe that this severe pain is frequently due to a closing of the normal ostium, and not infrequently one feels or hears the influx of air as the opening is entered,

Fig. 2.—A woman aged 36, with pain over the right temple and the right side of the face and with a discharge of pus from the right naris, had a history of cold of twelve days' duration. On irrigation, thick pus with considerable foul odor was returned. Iodized oil was injected before the cannula was removed, and a roentgenogram showed that the oil gravitated immediately to the bottom of the sinus. Note the oil lying on the thickened membrane, and the water level (*A*) in the right antrum. The left antrum shows normal filling and no infection. The second injection of oil was made four days later, and one week later the antrum was free from pus.

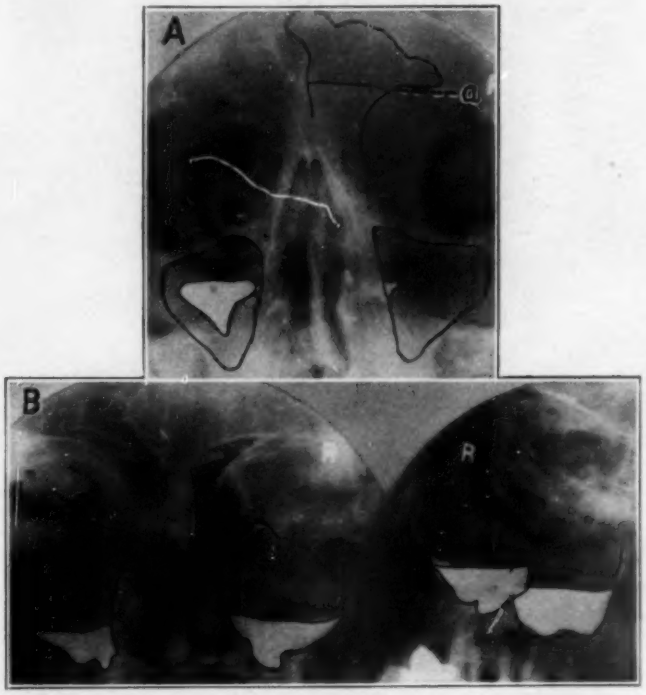

Fig. 3.—A man aged 74 had a history of an acute cold and bronchial cough of two weeks' duration. Very little oil was retained, as evidenced by roentgenogram *A*. Note the fluid level (*a*) in the right frontal sinus. Oil was injected again on the third, the sixth and the thirteenth day after the first injection. A check with oil and roentgenograms ten days later showed the sinuses to be clear and the filling of the antrum normal after four injections of iodized oil (*B*).

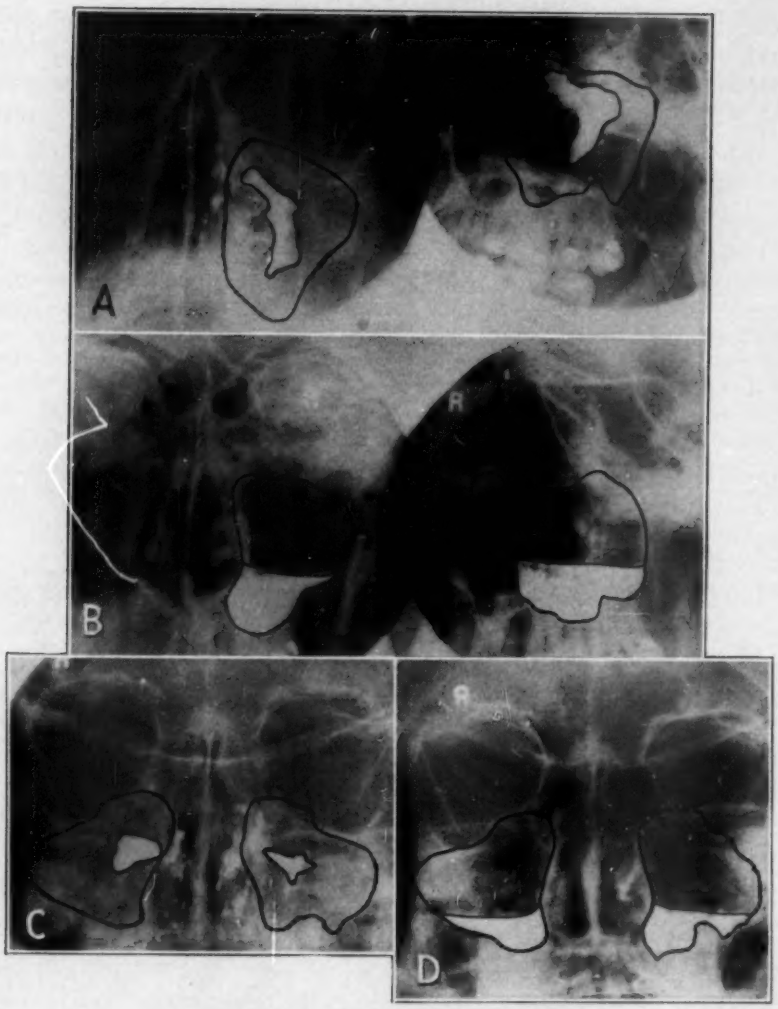

Fig. 4.—A man aged 28 had a cold for ten days and discomfort over the right antrum for six days. Note the marked filling defect in the right antrum (*A*). There was immediate improvement, and no further treatment was given for nine days, when a second injection and roentgenogram were made (*B*), showing that one injection of oil was sufficient to clear the sinus.

A boy aged 12 had a cold for three weeks and frontal headache on the left side for four days. A roentgenogram made after an injection of oil showed a marked filling defect in each antrum (*C*). There was immediate improvement. A second injection of oil was made seven days later. The sinuses were checked eleven days after the second injection (*D*), showing that two injections of oil were sufficient to clear the antrums, with relief of all symptoms. The infection in this case was severe. Recovery after two injections of oil was excellent.
after two injections of oil was excellent.

usually with relief of pain. At the first injection only a few drops of oil may be retained (fig. 3), or there may be a return of free pus, in which case irrigation may be done if desired and oil inserted at the end of the irrigation (fig. 2). However, many patients even with a discharge of free pus do well without irrigation.

Frequency of Injections.—If very little oil is retained or if there is a return of pus, I usually inject oil again on the third or fourth day and then wait five to seven days before making the next injection. Ten days later it is well to inject oil and make a second roentgenogram, to check the progress, unless free pus is returned after the injection. One to three injections are all that may be required for many acute infections or subacute infections in an early stage (fig. 4).

It has been my experience that an acutely infected antrum will empty more rapidly than a normal antrum on the opposite side if oil has been

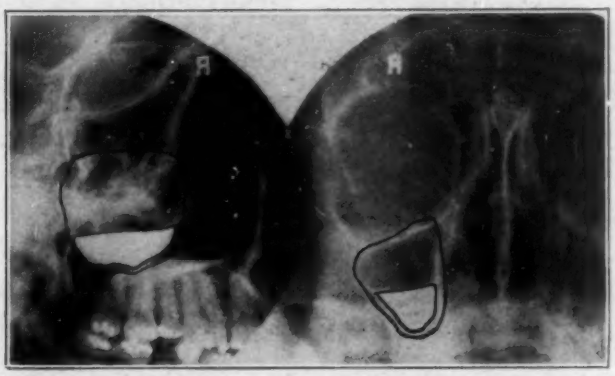

Fig. 5.—A woman aged 46 had a history of a severe cold three weeks before examination, with slight tenderness over the right antrum, followed by severe bronchial cough. An intranasal entrance into the antrum on the left side had been made after a dental infection four years before, and this sinus was clear, with a good opening. Oil was injected into the right antrum, and the patient stated that the cough was practically relieved within thirty-six hours. Frequently in cases of this kind there is no more than a 2 mm. thickening of the antral membrane. No further treatment was required in this case.

injected into the two cavities at the same time. This observation coincides with that of Bowen-Davies.[3]

SUBACUTE INFECTIONS

Subacute infections probably give the most spectacular response to injections of oil. Not infrequently patients with infection of this kind come for examination complaining of a cold which has persisted for two

3. Bowen-Davies, A.: The Paranasal Sinuses in Children, Proc. Roy. Soc. Med. **31**:1411-1415 (Oct.) 1938.

or three weeks or a severe bronchial cough which has not been relieved by cough remedies and codeine. Often the cough is relieved within forty-eight hours after the injection of oil (fig. 5). A roentgenogram is made at this time, and usually I do not make a second injection for ten days or two weeks, at which time oil is again injected and a roentgenogram made, to note the progress. If there is still cough or symptoms of remaining infection, the making of this second roentgenogram, front and side view on one film, is delayed for another ten days or more. Often a single injection gives relief to a patient with infection of this kind, and at the second injection the antrum may show perfect filling.

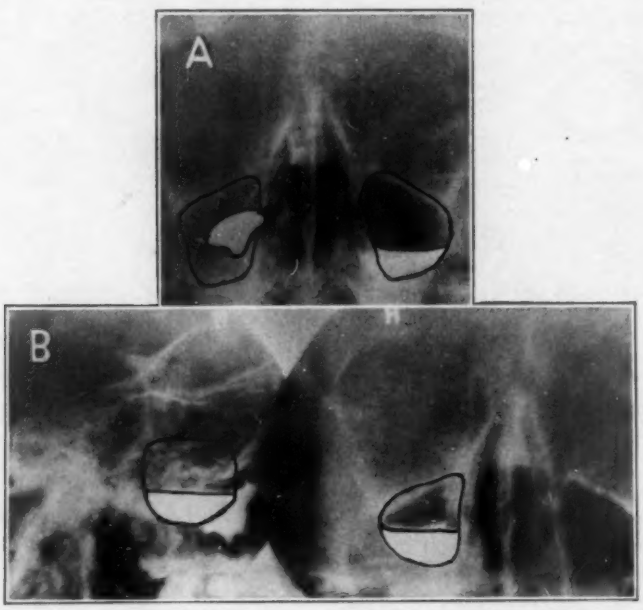

Fig. 6.—A boy aged 12 was seen by me in September. He had a history of pus discharge from the right side of the nose and cough following a cold in April (seven months previously). He had had nasal treatments and spent some weeks in Florida, hoping to be relieved. There was mucopus in the ethmoid region, and a roentgenogram revealed a marked defect in the filling of the right antrum (*A*), with clouding of the right ethmoid cells. Oil was again injected five, thirteen, nineteen, twenty-six and thirty-three days after the first injection—a total of six injections of oil. These were followed by a final injection of oil and the making of a roentgenogram three weeks later (*B*), which showed that recovery was complete.

CHRONIC INFECTIONS

The recuperating power of the antral membrane is often surprising (fig. 6). It has been my plan in cases of chronic infection to advise

surgical drainage, but if surgical intervention is contraindicated or operative treatment refused, I find that the injection of oil at intervals of ten days or three weeks will give the patient a great deal of relief. Even patients with atrophic rhinitis experience considerable comfort from the injection of iodized oil into the antrums, and if they have large normal ostiums, the treatment is simple. Some oil will remain in a sinus which is the site of chronic infection for an average of from seven to fourteen days.

SUMMARY

The use of iodized oil has greatly reduced the number of treatments necessary in cases in which irrigation was formerly used for the treatment of infection of the antrum.

When irrigation is used, iodized oil is injected before the cannula is removed. The oil will prevent water from standing on the floor of the antrum and has a favorable effect on the infected membrane.

Infection of the ethmoid sinuses and bronchial cough accompanying infection of the antrum are favorably influenced by the injection of iodized oil into the antrums.

Iodized oil is effective in the treatment of chronic infection which is in an early stage and helpful in the treatment of old chronic infection for which surgical treatment is refused or contraindicated.

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ABSTRACT OF DISCUSSION

Dr. Arthur W. Proetz, St. Louis: I have followed Dr. Goodyear's work for the last ten years and in that time have had considerable experience with iodized oils myself, but I have never been able to convince myself that I could do anything with them which I couldn't do better in some other way. I don't quite know how to reconcile Dr. Goodyear's experience with my own. I have tried to analyze the situation and to see what occurs when this type of oil is put in the sinuses. Iodized-chlorinized oils are chemically inert; the oil, iodine and chlorine are in chemical combination. They are not simply solutions. The oil is heavy; it has a high specific gravity and therefore sinks to the bottom, as Dr. Goodyear says. It is an oily principle. What is accomplished when a medium such as this is used?

(Dr. Proetz then showed two slides.)

Here in a test tube is 2 cc. of an oil such as that Dr. Goodyear describes, in 15 cc. of a watery solution (which is the average content of the antrum). The oil lies at the bottom of the fluid; very little floats on top. The interesting thing is that the solution in which this rests is 1 per cent silver nitrate.

Here it is again, after two hours at body temperature, and the solution is still quite clear. In other words, the iodine and the chlorine in the oil are not given off at all, are thoroughly well fixed and produce no precipitate.

There is 2 cc. of oil in a 15 cc. antrum. Since the oil goes to the bottom of a sinus, it is conceivable, of course, that it displaces the secretions lying there

and for the time being protects the membrane from the action of these secretions; but the best it can do is to push the secretions up perhaps 1 or 2 cc., and what then prevents these from similarly affecting the membrane a centimeter higher up?

It is difficult for me to see how a few applications of oil or any other solution can so affect what I understand to be the process of subacute, or chronic, sinusitis as to make so much difference. My experiences have not been those of Dr. Goodyear.

Dr. O. E. Van Alyea, Chicago: Iodized oil has been widely used in rhinologic practice for a number of years. Because of its radiopaque quality, it serves as an important diagnostic aid in cases of sinus disease. Dr. Goodyear, while using the oil as a contrast medium in the sinuses, inadvertently noticed another quality, its value as a therapeutic agent. This quality has been noted by others at various times. A few articles in the recent literature, both in this country and abroad, direct attention to the beneficial effects of the oil incidental to its use in contrast studies.

Dr. Goodyear advocates the use of iodized oil in the treatment of maxillary sinusitis in the various stages. In an ordinary case of acute sinusitis, at least in the early stages, little local treatment is indicated. It has long been generally conceded that there is a marked disposition on the part of an acute infection to heal spontaneously and that those infections which persist do so because of impairment of drainage. The same impairment which interferes with early healing may cause the condition to become chronic. Improvement at the proper time in the facilities for drainage may aid in the cure of a subacute infection and prevent the development of a chronic condition. The rhinologist has at his disposal certain local measures which are helpful in promoting drainage. He may apply decongestants to the mucosa of the middle meatus, and, if necessary, he may unblock the meatus by pushing aside an obstructing middle turbinate. He may also irrigate the sinus, and this in itself is one of the most useful measures available for the restoration of sinal drainage.

Irrigation may be carried out with comparative safety and very effectively, as Dr. Goodyear has stated, after the stage of acute engorgement has passed. The removal of a collection of pus or mucopus through a patent ostium by means of lavage with a saline solution aids materially in the reestablishment of ciliary action, which is so important to the health of the sinus.

All rhinologists have noted the remarkable improvement which often follows a treatment of this type. In many instances, no further therapy is needed. I wonder if the instillation of a heavy oil at this time is the best thing for the already overworked cilia. I should like to ask Dr. Goodyear if he hasn't found many infections of the subacute or early chronic type which responded to irrigation alone without the need of an antiseptic.

In a chronic condition, after changes in the tissues have taken place, the futility of irrigation therapy is well known. Overirrigation in any stage is harmful and may prolong the infection. Most observers think this result is due to the further trauma added to the disease of the mucosa rather than to the residue of the irrigating solution. Rhinologists are ever on the alert for some means short of surgical intervention which will aid in the relief of this condition. A search is being made for a solution which is not harmful to the mucosa yet is effective against the invading organisms. Perhaps Dr. Goodyear has found such an agent in the iodized oil. The solution described, aside from its effect on the cilia, should be harmless, being a weak solution of iodine in vegetable oil, and Dr. Good-

year vouches for its effectiveness. If he is able with his treatment to hasten recovery and to eliminate the need for surgical intervention in only a small percentage of cases, he has made a contribution which will be a welcome addition to the all too meager list of effective therapeutic measures.

Dr. Paul M. Moore Jr., Cleveland: For years all rhinologists have felt the need for some medicament which can be put into an infected sinus to hasten recovery. The ordinary antiseptics are eliminated, because if they are strong enough to affect the bacteria, they are too strong for the nasal and sinus mucosa and immediately disable an already crippled ciliary mechanism. The use of preparations such as these would result in further interference with the drainage from the sinus and in further stagnation of the pus.

The ideal preparation would have no detrimental effect on the ciliary mechanism; it would tend to shrink the swollen tissues and allay the inflammation, so that better drainage would be obtained, and it would inhibit the growth of the invading bacteria or affect them in such a way that the defense forces of the body could dispose of them more readily.

The iodized oil suggested by Dr. Goodyear may fulfil at least some of these requirements. It has been used for many years in mapping sinuses and lungs and has not seemed to cause any detrimental effects. I am inclined to think that the good results reported by Dr. Goodyear are due to the mechanical displacement of the pus and not to any bactericidal effect of the iodized oil.

One point which Dr. Goodyear mentioned in his paper and which has been commented on by Dr. Van Alyea can well be emphasized even further. This is the danger involved in too frequent irrigation of an infected sinus. While cleanliness of any infected tissue is the most important factor in treatment, avoidance of trauma is a close second. All rhinologists have seen too many infections in sinuses, mastoidectomy wounds and elsewhere perpetuated by overtreatment. An infected sinus should not be irrigated more often than every three or four days, and many do better when treated at even longer intervals. Each case should be judged on its own merits and the optimum interval determined.

No matter how expert one may be, a certain amount of trauma occurs every time a sinus is washed. Even though the trauma be ever so slight, if it is repeated often enough, it will result in further swelling of the tissues and interference with the drainage from the sinus. For this reason I am opposed to the daily irrigation of sinuses.

Also, it is sometimes wiser to puncture and wash through the inferior meatus than to wash through the natural ostium. While I use the natural ostium in the great majority of cases, I find that in some the ostium is so difficult to open that I cannot help traumatizing the tissues too much in the insertion of the cannula. This results in further swelling of the tissues in the middle meatus, which in turn interferes further with the drainage of the sinus and defeats the purpose of the treatment. If one must produce much trauma in order to wash a sinus, one should make sure that this takes place in the inferior meatus, where no harm will result.

Dr. Theodore E. Walsh, St. Louis: I was much interested in Dr. Goodyear's paper, but I feel, as Dr. Proetz does, that I can't quite understand how the treatment works. It just doesn't make sense to me that it should come out so well. Is this because the oil is an antiseptic? One can hardly believe so. Is it because of the displacement of secretions? Again, one can hardly believe so, because if that were true, then washing alone would be efficient. Why is it,

then, that Dr. Goodyear gets such good results all the time? It is possible that it is because of the shrinking of the tissues in the middle meatus when he puts in the oil. I think all rhinologists have obtained comparable results in many cases simply by shrinking the nasal mucosa, allowing some ciliary drainage from the sinuses.

I have seen roentgenograms similar to Dr. Goodyear's, in which the blown-up membranes characteristic of an acute infection were seen to have resolved completely with no treatment at all in a week or two, and I cannot see how the oil could have anything to do with that resolution. Neither can I understand how oil alone can make a chronically infected membrane a normal membrane in time. If one examines sections of the infected tissues, there is evident so much fibrosis and so much change that I don't see how anything can make the membranes resolve.

Dr. Frank R. Spencer, Boulder, Colo.: I have used iodized oil in the maxillary sinus particularly a number of times for diagnosis, only occasionally for therapy.

I should like to ask Dr. Goodyear if he has had any difficulty with iodized oil going down through the larynx and trachea into the lungs. There is quite a little in the literature now about the danger of lipoid pneumonia. I am sure that any one as careful as he is can probably avoid that complication. We in the outpatient clinic at the University of Colorado use iodized oil routinely for displacement of the contents of the sinuses and for treatment. It is a valuable method of treatment. We also on occasion use weak solutions of ephedrine in saline solution. We use other remedies, too, of course, but the use of iodized oil is a valuable contribution to the treatment of diseases not only of the maxillary sinus but of all the sinuses.

I am in favor of irrigating an acutely infected maxillary sinus after the first few days. I do not restrict the route of irrigation to the middle meatus or to the inferior meatus alone; I like to irrigate through either the inferior or the middle meatus, depending on which seems best for the particular patient. Sometimes, if one tries one method and it doesn't work, one must try the other. I like to do for each patient what seems best.

Dr. Henry M. Goodyear, Cincinnati: I want to thank all those who have participated in the discussion for their kindness and important contributions to my subject.

I shall answer first Dr. Proetz and Dr. Walsh, who feel that this treatment is difficult to explain on a chemical basis. I agree that from a chemical standpoint it has not been explained satisfactorily, yet empirically it works.

The preparation may have had something to do with the results I have shown here. The oil I have been using has two halogens, iodine and chlorine, uniting on adjacent carbon atoms of the unsaturated fatty acid esters of the peanut oil. In general, compounds having both iodine and chlorine attached to adjacent carbon atoms possess greater stability than those having two iodine atoms in similar positions.

Having a specific gravity of 1.23 at 25 C., the oil is sufficiently heavy to displace mucopurulent secretions present in infected cavities by gravitating to the bottom of these spaces and displacing the materials contained therein. Thus, even the mechanical action has a beneficial influence as a therapeutic agent. I have not been able to demonstrate bactericidal action in a test tube. Yet iodism will occur quickly after injection of the antrum in people sensitive to iodine.

I hope that what I have given here this morning may help to stimulate further investigation. Dr. Proetz has done excellent work in research, and I hope he will do something in determining just how iodine acts chemically in the antrums.

Dr. Van Alyea asked if I did not get as good results with irrigation. No. In fact, I have done fewer irrigations each year for the past five or six years, until now I rarely irrigate an antrum but depend on the iodine-chlorine oil for treatment and for roentgen diagnosis.

Dr. Moore has suggested that perhaps the result is due to mechanical displacement. No doubt this feature is of importance.

Dr. Spencer asked if this oil migrates to the lungs. I do not know if it does. It is a vegetable oil. I have had no unfavorable results from its use.

PRIMARY PSEUDOCHOLESTEATOMA OF THE EAR

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During the past generation there have been many heated arguments as to the pathogenesis and nature of cholesteatoma of the ear. As yet there are no universally accepted theories. The nomenclature itself is confusing. In this paper I shall attempt to clarify the situation and suggest a more uniform nomenclature.

DEFINITION

"True cholesteatoma," or "cholesteatoma verum," is the term used for a congenital tumor. I believe the term "cholesteatoma" should be limited to the true congenital tumor which develops from a congenital misplaced epidermal anlage. There are a few rare instances of such a tumor developing in the temporal bone. The so-called primary congenital cholesteatoma developing in the temporal bone, however, is in most instances not congenital but develops as a direct result of an invasion of the epidermal epithelium through a perforation of Shrapnell's membrane. Any cholesteatoma which develops as a result of an ingrowth of epidermis into the middle ear cavity should be called "pseudocholesteatoma" to differentiate it from the congenital tumor. It may be classified as secondary or primary, depending on whether it develops as a result of a suppuration with a marginal defect of the drum membrane or as a result of a defect in the drum membrane in the absence of infection. The more common type is the secondary, in which the skin from the external canal grows into the middle ear or attic to replace ulcerated and necrotic mucous membrane such as may be frequently found in patients with scarlet fever and other types of necrotic otitis. Authorities are generally agreed as to the manner of development of the secondary pseudocholesteatoma. The primary type develops through a defect of Shrapnell's membrane, and it is this development over which there has been so much argument and conflict of ideas. Unfortunately, many of the Continental European writers use the term "genuine cholesteatoma" for the primary type, and this has resulted in confusion of this type with the congenital type.

Read at the Forty-Seventh Annual Meeting of the American Laryngological, Rhinological and Otological Society, Inc., Los Angeles, June 17, 1941.

PATHOGENESIS

Habermann [1] and Bezold [2] originated the theory that epidermis grows into the middle ear from the external canal. The assumption by Wendt [3] that a metaplasia occurs in which the mucous membrane changes its nature and throws off squamae has had a few followers, notably Tumarkin.[4] Proponents of the theory of congenital cell inclusion, which originated with Virchow,[5] include McKenzie [6] and Diamant,[7] also Teed.[8] (Holmes [9] in reporting a large number of cases failed to consider the possibility of primary pseudocholesteatoma at all and tried to classify all cases as instances of cholesteatoma either secondary to suppuration or congenital.) The theory that primary pseudocholesteatoma is due to invasion has been generally accepted with modifications both in Europe and in this country. The chief disagreement has been as to how the invasion takes place, some contending that it follows an infection and others that it is primary. Nager [10] agreed with Lange [11] and Hellman,[12] who claimed that under the influence of chronic irritation the epidermis of Shrapnell's membrane shows a tendency toward deep ingrowth from conelike extensions and that these push the mucous membrane of the middle ear before them or force it from its base and produce epidermic scales in the center. Wittmaack,[13] on the other hand, disagreed as to this and claimed that no cholesteatoma could develop from a solid epithelial cone. He cited the fact that in malignant degen-

1. Habermann, J.: Zur Entstehung des Cholesteatoms der Mittelohr, Arch. f. Ohrenh. **27**:42, 1888.

2. Bezold, F.: Cholesteatom, Perforation der Membrana flaccida Shrapnelli und Tubenverschluss, Ztschr. f. Ohrenh. **20**:5, 1890.

3. Wendt, H.: Desquamative Entzündung des Mittelohrs, Arch. d. Heilk. **14**:428 and 551, 1873.

4. Tumarkin, A.: Middle Ear Suppuration and Cholesteatoma, J. Laryng. & Otol. **53**:685 and 737, 1938.

5. Virchow, R.: Ueber Perlegeschwülste, Virchows Arch. f. path. Anat. **8**:371, 1855.

6. McKenzie, D.: Pathogeny of Aural Cholesteatoma, J. Laryng. & Otol. **46**:163, 1931.

7. Diamant, M.: Acute or Chronic Otitis? Acta oto-laryng. **25**:507, 1937.

8. Teed, R. W.: Cholesteatoma Verum Tympani, Arch. Otolaryng. **24**:455 (Oct.) 1936.

9. Holmes, E. M.: A Review of Three Hundred and Three Cases of Cholesteatoma, Ann. Otol., Rhin. & Laryng. **47**:135 (March) 1938.

10. Nager, F.: The Cholesteatoma of the Middle Ear, Ann. Otol., Rhin. & Laryng. **34**:1249 (Dec.) 1925.

11. Lange, W.: Tief eingezogene Membrana flaccida und Cholesteatom, Ztschr. f. Hals-, Nasen- u. Ohrenh. **30**:575, 1932.

12. Hellman, K.: Studien über das sekundäre Cholesteatom des Felsenbeins, Ztschr. f. Hals-, Nasen- u. Ohrenh. **11**:406, 1925.

13. Wittmaack, K.: Wie entsteht ein genuines Cholesteatom? Arch. f. Ohren-, Nasen- u. Kehlkopfh. **137**:306, 1933.

erations of pavement epithelium one observes cavity formations but never cholesteatoma. He proposed the theory that a hyperplastic, embryonic mucosa is necessary, plus a negative pressure, produced by the separation of the attic and tubotympanic space by bridges of tissue. This acts as the biologic stimulus for ingrowth of the pavement epithelium. Some authorities admit that actual rupture of Shrapnell's membrane may occur but claim it is unnecessary, because occasional cases are observed of cholesteatoma behind a Shrapnell's membrane that is apparently intact, though it may show scarring or depression. It is my belief that in these cases a perforation occurred and later closed, after epidermis had grown into the attic. I have 3 cases in my series in which this occurrence was definitely observed. Other ingenious theories, some of them plausible, have been presented for the stimulation and growth of epidermis through Shrapnell's membrane. However, as Wittmaack admitted, "the only practical method in arriving at conclusions is to fall back on clinical and operative findings." There are a number of noteworthy observations which may be made in a series of cases with depression or perforation of Shrapnell's membrane.

1. There is usually a partly or totally compact, sclerotic type of mastoid.

2. A suppuration, if present, is usually confined to the attic and is walled off from the middle ear below.

3. Patients with a dry perforation of Shrapnell's membrane but with no evidence of cholesteatoma or history of ear trouble are not uncommon.

4. The hearing is usually affected very slightly, if at all, unless the middle ear itself is invaded.

5. Well developed cholesteatoma may be present behind Shrapnell's membrane with perforation of this membrane but with total absence of suppuration and no history thereof.

6. The onset of suppuration through a perforation in Shrapnell's membrane occurs insidiously, rarely with any symptoms. The onset may occur at any time during life.

7. Cholesteatoma is nearly always present if there is a suppuration through a perforation in Shrapnell's membrane.

8. Nager stated that "an isolated perforation of Shrapnell's membrane assumes a place of its own, since middle ear suppuration never perforates at this spot and cannot be held responsible for the origin of cholesteatoma."

9. A perforation through Shrapnell's membrane may close.

In the light of the aforementioned clinical observations I think a simple explanation can be given for the perforation of Shrapnell's membrane and the development of primary pseudocholesteatoma. If the eustachian tube is blocked by infiammatory reaction or by foreign

material, any air that is in the middle ear is absorbed and replaced with fluid from the tissues, with a consequent retraction of the drum membrane proper. When the drum membrane is retracted, the long process of the malleus is drawn inward. This pushes the short process and the head of the malleus outward, which causes stretching and tension of Shrapnell's membrane, with the result that the latter does not show retraction. In such a case there is usually no inflammatory reaction in the middle ear itself. If, however, irritating fluid or foreign material reaches the middle ear, there is an inflammatory reaction in which nature tries to wall off and expel or absorb the foreign material. This may readily happen in infancy, whether it occurs at birth from hemorrhage or the ingress of vernix caseosa or meconium or later from that of vomitus, milk or other fluids. The middle ear and attic are already partially filled with a loose, embryonic type of tissue. The inflammatory reaction causes this tissue to swell and, with a narrow space between the upper margin of the drum membrane, the ossicles and the inner wall of the middle ear, little swelling is required to seal off entirely the middle ear proper from the attic above it. When this sealing-off occurs, a reaction occurs in the attic and antrum similar to that of the middle ear with closure of the eustachian tube. Any air which may be present in the attic and antrum is absorbed, creating a negative pressure in the attic with consequent retraction of Shrapnell's membrane, usually in its anterior segment. The retraction may result in perforation. If this occurs, the epidermis will grow into the attic from the margins of the perforation. Much more frequently, however, a rupture does not occur, but the lining of Shrapnell's membrane under the depression becomes adherent to the attic wall and thus the depression remains permanent. The failure of this depressed area to rupture may be due to the fact that the sealing-off of the attic is temporary or incomplete. Cholesteatoma will form only if perforation occurs. When epidermis grows through a perforation of Shrapnell's membrane, it rapidly replaces the delicate embryonic epithelial lining of the walls of the attic. Sometimes this formation of an epidermal lining will not progress behind the malleus; in such a case there may be found a cavity, limited to the anterior part of the attic, lined with skin, and with or without cholesteatoma formation. Cholesteatoma forms only when there is an inadequate outlet for desquamated epithelium. The primary stimulus for desquamation, as I have pointed out in a former paper,[14] is moisture, whether this be water, serum, mucus or pus. In the absence of infection, skin may completely replace the mucosa, and the moisture may be evaporated with little desquamation. If this occurs, the person may go for many years, or even through life, without cholesteatoma formation. However, the

14. Day, K. M.: Etiologic Factors in the Formation of Cholesteatoma, Ann. Otol., Rhin. & Laryng. **43**:837 (Sept.) 1934.

introduction of moisture or infection may start the formation of cholesteatoma at any time. Even with cholesteatoma formation, if there is enough aeration to provide evaporation of the moisture and if infection does not occur, the cholesteatoma may become dry and quiescent, and remain inactive until some form of moisture is readmitted. The occasional case reported of acute infection of the attic with perforation of Shrapnell's membrane is probably a case of secondary infection of an attic already lined with epidermis, and if the patient could have been examined before the acute infection, it would have been found that a minute perforation already was present.

TREATMENT

Many of the patients with suppuration and cholesteatoma of the attic can be treated conservatively by irrigation of the attic with anhydrous solutions, a treatment that will often result in a dry, clean ear. If there are signs or symptoms of extension of the infection beyond the bony limits of the attic and antrum, or if granulation tissue is present which cannot be reached and removed by instrumentation or caustics, conservative treatment should not be tried. If there is clinical or roentgen evidence of a large cholesteatoma and this cannot be evacuated through the small opening, conservative treatment should not be attempted.

OPERATION

The operation of choice for these patients is the Bondy type of modified radical mastoidectomy. Unless skin has actually invaded the middle ear proper, I have employed the Bondy operation. Even in the presence of a large central perforation of the drum membrane, if the middle ear is lined with mucosa, by preserving the drum membrane and the contents of the middle ear, hearing is maintained at a much higher level, healing is more rapid and one is not faced with a troublesome tubal discharge. If the incudostapedial joint is intact, the ossicles should not be removed. However, if there has been absorption of the long process of the incus, I find it preferable to remove that ossicle and also the head of the malleus, even if there is a resulting gap between the attic and the middle ear proper. In case of a gap joining the attic cavity with the middle ear, a small flap can be turned in from the upper margin of the membrana tensa to bridge the gap, which seals off readily if a skin graft is employed over a mold and covers the upper edge of the drum membrane. I make it a cardinal rule to employ the complete radical operation when epidermis has invaded the middle ear proper. There have been many arguments against radical surgical intervention because of its effect on hearing. If, however, the surgical procedure is adapted to the individual condition, the hearing should be little or no worse after operation and frequently is much improved.

PROPHYLAXIS

The main reason for my presenting this paper is that I believe many of these lesions can be prevented by proper feeding of infants. It seems significant that completely compact and acellular mastoids are rare, whereas many show only partial cellular development. If air cells develop, it must mean there was air in the infant's ear after birth, and imperfect pneumatization must mean that there was subsequent blocking of the ventilation of the middle ear. I have found that when a magnifying speculum is used in routine examination of ears, approximately 12 per cent of all ears examined show a depression or defect in the anterior part of Shrapnell's membrane. This closely coincides with the percentage of mastoids which are sclerotic or only partially pneumatized. In a roentgen study of 300 consecutive patients, MacMillan [15] observed 16 per cent of the mastoids to be underdeveloped with cells limited to periantral, retrofacial and a few tip cells. With infants who vomit and regurgitate, the entrance of fluids into the middle ear cannot always be prevented. However, the common practice of feeding an infant from a bottle while the infant is lying on its back is the likeliest way of causing fluid to enter the eustachian tubes and middle ears. Even an adult cannot swallow when lying on his back without a tendency to draw fluid into the nasopharynx. Many times in the infant wards I have had the experience of opening an ear drum and seeing cloudy fluid escape, with prompt closure, though the infant showed no evidence of infection and no rise in temperature. I mistakenly thought that the infant had a low grade infection, whereas the probable explanation was that fluids from the nasopharynx had seeped into the middle ear.

Briefly I am reporting a few of my cases to illustrate and support my conclusions.

REPORT OF CASES

CASE 1.—The patient was a man aged 52. His past history was completely negative for any ear trouble or infection. One year previously he began to have tinnitus with impairment of hearing in his left ear, accompanied by some vertigo. He was treated by several otologists, mostly by inflations, with slight temporary relief. The left ear revealed a small crust covering the anterior part of Shrapnell's membrane, the removal of which revealed a questionable perforation. The right ear revealed a large attic perforation, anterior to the head of the malleus; the cavity was lined with skin and was apparently perfectly healthy. Roentgenograms disclosed sclerotic mastoids with enlargement of the left antrum. A Bondy operation on the left side revealed a large wet cholesteatoma completely filling the antrum and attic. Smears and cultures were negative. Prompt recovery followed treatment; the cavity healed in one month.

This was a case of sterile cholesteatoma with attic perforation which had been unrecognized and had become moist and active within the

15. MacMillan, A. S.: Personal communication to the author.

past year. In the right ear, cholesteatoma had failed to form because there was an adequate outlet for the discharge of desquamated epithelium.

CASE 2.—A man aged 48 had experienced deafness of the right ear for six years and of the left ear for two months. He had no other symptoms. He thought he had "bealing" ears as a child. His ears had been inflated by several otologists with temporary relief. On examination each ear showed a small crust covering the anterior part of Shrapnell's membrane, removal of which revealed a pinhole perforation with a cholesteatoma behind it; there was yellowish discoloration of the upper half of each drum membrane. The average loss of hearing for speech was 50 decibels. Roentgenograms showed sclerotic mastoids with slight cell development; there was no enlargement of the antrums. Operation revealed cholesteatoma in each ear, filling the attic and only partly filling the antrum. The tumors were dry and leathery. Smears and cultures were sterile. The incus in the right ear had been absorbed. In the left ear, the long process had become disconnected from the stapes. A Bondy type of operation was performed with removal of the incus and the head of the malleus from each ear. The cavities healed in four weeks.

This was a case of unrecognized dry cholesteatoma of both ears, seriously affecting the hearing. Postoperatively, hearing improved to a level practical for normal conversation. The average loss of hearing was 25 decibels.

CASE 3.—A boy aged 9 had acute earache accompanied by swelling below the ear. His past history was completely negative. An otologist incised the drum membrane; there was a slight discharge; the swelling at the angle of the jaw increased to involve the whole side of the neck. The temperature rose to 105 F. There was a dish-watery discharge from the ear; the canal collapsed. Roentgen examination showed a large cavity in a sclerotic mastoid. Operation disclosed an enormous cholesteatoma filling the mastoid, with exposure of the posterior fossa, and extending downward along the lateral sinus through the jugular foramen. The lateral sinus was thrombosed. Cholesteatoma was found in the digastric fossa and in the neck. A pure culture of a "hemolytic staphylococcus" was obtained. A secondary Bondy operation was performed and an anterior perforation of Shrapnell's membrane was identified. At the end of an uneventful convalescence the patient had a healed middle ear and an intact drum membrane.

This was a case of a large sterile cholesteatoma becoming acutely infected.

CASE 4.—A patient aged 20 underwent a radical left mastoidectomy at the age of 7. The right ear showed an anterior attic perforation but no evidence of infection, and hearing was normal. She remained under my observation for ten years with no symptoms. Three years ago she had acute otitis on the right side with rupture of the drum membrane. Within two weeks a cholesteatomatous discharge appeared, coming from the attic. The middle ear and attic cavities appeared connected. Operation was refused for two years, although there was continuous discharge of mucus from the middle ear and cholesteatomatous discharge from the attic, and hearing progressively diminished. Then a Bondy type of operation was performed. A cholesteatomatous cavity of the anterior part of the attic was found, with erosion exposing the mandibular joint. The mastoid

antrum was not enlarged but contained a small amount of cholesteatoma. Postoperative convalescence was rapid; the perforation of the drum membrane closed, and hearing improved from an average loss of 50 decibels to a loss of 35 decibels.

In this instance the patient was under constant observation for ten years with an attic perforation and the attic lined with skin. An acute infection of the ear extended to the attic and caused cholesteatoma formation.

CASE 5.—A man aged 32 had a discharge from the right ear for six months without pain. Examination showed a small anterior attic perforation. Irrigation of the attic revealed cholesteatoma. After irrigation of the ear the patient began to have pain in the ear, and in a few days the drum membrane ruptured with a cholesteatomatous discharge from above and below. A simple mastoidectomy was done. The antrum and aditus seemed lined with mucous membrane with no evidence of cholesteatoma. The ear continued to discharge. One year later a modified radical operation was carried out. The mastoid cavity from the former operation was found completely filled with cholesteatoma. There was prompt healing, with a small persistent central perforation of the drum membrane.

In this case, two errors were committed. First, an attempt was made to perform lavage of the attic through too small a perforation. The result was a breaking of the barrier between the attic and the middle ear. Second, simple mastoidectomy was mistakenly performed, which left a large cavity for cholesteatoma to fill. This it did in one year.

CASE 6.—A woman aged 50 had chronic attic suppuration with cholesteatoma. The ear became dry after a few treatments. The attic perforation has been closed for twelve years, with no symptoms or signs of infection or cholesteatoma.

CONCLUSIONS

1. The term "cholesteatoma" should be used only to designate a true congenital tumor.

2. A cholesteatomatous formation developing from ingrowth of epidermis through a defect of the drum membrane should be called "pseudocholesteatoma." It may be secondary to infection or primary.

3. An actual perforation of Shrapnell's membrane is essential for ingrowth of epidermis.

4. A closure of the eustachian tube will not produce a retraction of Shrapnell's membrane.

5. A retraction of Shrapnell's membrane is caused by a closure of the attic from the middle ear due to the entrance of irritating fluids or foreign material into the latter. This is analogous to the reaction of the middle ear following a closure of the eustachian tube.

6. The improper feeding of infants is largely responsible for the large number of underdeveloped mastoids and also for retraction and rupture of Shrapnell's membrane.

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DIAGNOSIS OF ALLERGY OF THE NOSE AND PARANASAL SINUSES

WITH PARTICULAR ATTENTION TO THE ATYPICAL TYPES

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During the past few years the otolaryngologist has displayed an increasing interest in the important part played by allergy as a common cause of disease of the nose and paranasal sinuses. There are, however, far too many articles on the subject of nasal and sinal disease in which allergy is not given consideration. There should be no difficulty in recognizing typical cases, yet there is evidence that they are frequently overlooked. Atypical cases may present vague symptoms or some other associated condition may dominate the clinical picture.

The comparative incidence of allergy and sinusitis, according to the few available statistical reports, shows a great deal of individual variation. Jervey [1] reported, for example, that during the years 1924 to 1928 there were noted 421 cases of sinusitis and 11 cases of allergy among 1,566 cases of disease of the ear, nose and throat. Between 1929 and 1933 there were 328 cases of sinusitis and 20 cases of allergy among 1,395 cases of disease of the ear, nose and throat. From 1934 to 1938 there were 305 cases of sinusitis and 76 cases of allergy among 2,419 cases of disease of the ear, nose and throat. In other words, the percentage of cases of allergy increased from 0.7 per cent during the first five year period to 3.1 per cent during the last five year period.

According to the observations of Swann,[2] sinal disease is of allergic origin in from 20 to 30 per cent of the cases.

In a review of 3,657 consecutive cases seen in a practice including the eye, ear, nose and throat Kuhn [3] noted that 720, or 20 per cent, of the patients had nasal complaints, of whom 140, or 19.4 per cent,

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Read before the Section on Laryngology, Otology and Rhinology at the Ninety-Second Annual Session of the American Medical Association, in Cleveland, June 5, 1941.

1. Jervey, J. W., Jr.: Conservative Management of the Sinuses, South. M. J. **32**:278, 1939.

2. Swann, C. C.: Allergy as Related to Otolaryngology, Arch. Pediat. **53**: 730, 1936.

3. Kuhn, H. A.: Allergy in Ear, Nose and Throat Practice, J. Indiana M. A. **32**:241, 1939.

had nasal allergy. This group constituted 3.7 per cent of the entire series.

According to the statistics which my associates and I have compiled,[4] the incidence of allergy in cases of disease of the ear, nose and throat is about 16 per cent, and among all cases of nasal and sinal disease, about 40 per cent. The incidence of allergy in any individual practice is proportional to the accuracy of the diagnosis of allergy.

Watkins [5] emphasized that allergic phenomena are very common among nasal diseases and are likely to be overlooked unless a careful history is recorded and a thorough examination instituted. He further stated that the failure to recognize allergy is responsible for many unsatisfactory results from surgical intervention.

According to the observations of Oppegaard,[6] 30 per cent of the cases of nasal disease present local allergic changes, and these changes are often associated with other manifestations of allergy. He expressed the belief that every nasal obstruction should be considered as of possible allergic origin until proved otherwise.

Jay [7] directed attention to the importance of recognizing the atypical cases of nasal allergy in which the characteristic symptoms and signs are absent.

Fox, Harned and Peluse [8] called attention to certain types of borderline or subclinical allergy of the upper respiratory tract and the relation of these to hyperplastic changes in the tissues involved. They pointed out that the difficulties in properly evaluating the symptoms and pathologic changes result in the classification of these borderline conditions under diseases in no way related to allergy. They emphasized that the atypical symptoms and signs and the difficulty sometimes encountered in demonstrating a diagnostic eosinophilia of the secretions make a diagnosis difficult to establish.

In a statistical report of 162 cases of nasal allergy Clarke and Rogers [9] noted that 73 per cent of the patients had already had one, and 20 per cent had had more than one, operation on the nose and throat.

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4. Hansel, F. K.: Allergy of the Nose and Paranasal Sinuses, St. Louis, C. V. Mosby Company, 1936.

5. Watkins, A. B. K.: Allergy in Oto-Rhino-Laryngological Practice, M. J. Australia **2**:810, 1934.

6. Oppegaard, C. L.: Nasal Obstruction: Is It Allergic? Minnesota Med. **23**:112, 1940.

7. Jay, H. M.: Manifestations of Nasal Allergy: Their Diagnosis and Treatment, Brit. M. J. **2**:833, 1936.

8. Fox, N.; Harned, J. W., and Peluse, S.: Borderline Allergy: Its Relation to Hyperplastic Disease of the Respiratory Tract, Arch. Otolaryng. **51**:502 (March) 1940.

9. Clarke, J. A., Jr., and Rogers, H. L.: A Statistical Study of Allergic (Vasomotor) Rhinitis, Arch. Otolaryng. **25**:124 (Feb.) 1937.

In a review of 46 cases of submucous resection for nasal obstruction, Johnson [10] found that this condition does not of itself cause a characteristic impairment of hearing. He concluded, therefore, that submucous resection is not to be recommended as a means of improving deficiencies in hearing. Our experience in this respect has been similar. In a number of cases in which a submucous resection had been performed for nasal obstruction, obstruction of the eustachian tube and impairment of hearing without relief, we found that allergy was the principal cause of the symptoms, and definite results were obtained by allergic management. Improvement in nasal and tubal obstruction was often striking. In some instances there was improvement in hearing.

Arbuckle [11] advocated due consideration of allergy of the paranasal sinuses, conservative operative management of such conditions and the value of allergic methods of treatment. He further pointed out that the not infrequent disappearance of allergic symptoms following surgical intervention is only temporary.

Williams and Mousel [12] pointed out that satisfactory results from surgical procedures on the paranasal sinuses are dependent on accurate diagnosis and on choice of the proper type of operation. They further stated that the recognition and consideration of allergy are important.

Black [13] emphasized the importance of differentiating between chronic sinusitis and nasal allergy even though there is roentgen cloudiness of the sinuses.

A great many analyses of cases of sinal disease still appear in the literature without any consideration of allergy. For example, Syme [14] reported the gross pathologic observations in 100 consecutive cases of antral disease in which the antrum was operated on by the radical Caldwell-Luc method. The changes indicated a high incidence of allergy, but this condition was not mentioned.

In discussing the general principles of diagnosis and treatment of sinal disease Fletcher [15] considered the subject from the standpoint of infection and did not even mention allergy as a factor.

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10. Johnson, M. R.: Nasal Obstruction and Impairment of Hearing, Arch. Otolaryng. **33**:536 (April) 1941.

11. Arbuckle, M. P.: End Results of External Operations on the Frontal, Ethmoid and Sphenoid Sinuses, Arch. Otolaryng. **30**:736 (Nov.) 1939.

12. Williams, H. L., and Mousel, L. H.: Diagnosis and Treatment of Chronic Disease of the Paranasal Sinuses, Ann. Otol., Rhin & Laryng. **49**:466, 1940.

13. Black, J. H.: Perennial Hay Fever Diagnosis as Chronic Sinusitis, Internat. Clin. **1**:266, 1938.

14. Syme, W. S.: Disease of the Antrum of Highmore Operated on by Caldwell-Luc Radical Operation: Review of One Hundred Consecutive Cases, Glasgow M. J. **8**:87, 1936.

15. Fletcher, W.: The Sinuses as Points of Focal Infection and the Treatment of Sinusitis, Laryngoscope **48**:17, 1938.

In an analysis of a series of 100 cases of chronic antral disease Lathrope, Peer and Paddock [16] classified the conditions found as suppurative in 50 cases and hyperplastic in 49. Sixty-three patients had frequent colds, 14 had asthma and 8 hay fever. Allergy was not discussed as a factor.

In an analysis of the results from 854 consecutive roentgen examinations of the sinuses Johnson [17] noted an agreement between positive clinical and positive roentgen findings in 80 per cent of the cases. Pathologic changes were found in 131 of 133 patients subjected to surgical intervention. Pus was noted in 63 and thickened membrane in 67. There was no consideration of allergy in the entire group of cases.

In 1930 McLean [18] reported his observations on a group of 582 children with colds, among whom there were 90 who had asthmatic bronchitis or spasmodic croup. It was stated that contact had little if anything to do with the incidence of recurrent infections. It is evident that allergy played a part in this group of cases, but it was not considered as a factor.

In discussing allergic and infectious conditions of the upper respiratory tract in children, Cohen and Rudolph [19] in 1931 emphasized the importance of differentiating these two types of diseases, as well as a combination of both. The diagnostic points were illustrated in a comprehensive chart.

Clarke [20] particularly emphasized the importance of early diagnosis of allergic disease of the respiratory tract. He pointed out that nasal symptoms and bronchitis in children often precede the onset of dyspnea. Adequate allergic management, he stated, may prevent the onset of asthma.

Clein [21] also pointed out that many physicians subject children who have frequent colds and cough to tonsillectomy and other types of treatment without differentiating between allergy and infections.

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16. Lathrope, G. H.; Peer, L. A., and Paddock, R.: The Importance to the Internist of Latent Paranasal Sinusitis, Ann. Int. Med. **12**:1576, 1939.

17. Johnson, V. C.: The Value of Roentgen Examination of the Paranasal Sinuses, Radiology **32**:303, 1939.

18. McLean, C. C.: The Incidence of Recurrent Respiratory Infections in Childhood, J. A. M. A. **95**:1338 (Nov. 1) 1930.

19. Cohen, M. B., and Rudolph, J. A.: Allergic and Infectious Conditions of Upper Respiratory Tract in Children: Differential Diagnosis, J. A. M. A. **97**:980 (Oct. 3) 1931.

20. Clarke, J. A., Jr.: Early Diagnosis of Allergic Disease of Respiratory Tract, Pennsylvania M. J. **38**:408, 1936.

21. Clein, N. W.: Allergy as Cause of Frequent Colds and Chronic Coughs in Children, Northwest Med. **35**:347, 1936.

Persky [22] stated that the causes of rhinorrhea in children, especially in those who have already had their tonsils and adenoids removed, should be carefully investigated and that among other causes allergy should always be considered.

Barnett and Carnahan [23] expressed the belief that removal of the tonsils and adenoids may aggravate symptoms in children with uncontrolled allergy. In diagnosing allergy they placed a great deal of importance on the cystologic findings in the nasal and bronchial secretions.

Gewanter [24] and also Kerley [25] emphasized the importance of considering allergy in the diagnosis and treatment of frequent colds and sinusitis in children.

In an analysis of 100 cases of sinusitis in children Crooks [26] discussed the symptoms, the local changes, the roentgen findings, the antral washings, the bacteriologic findings and finally the operative treatment and the results obtained. No cytologic studies were made, and allergy was not mentioned as a possible etiologic factor.

Likewise, Birdsall [27] presented a most comprehensive study of 80 cases of sinusitis in children, and although a critical analysis of his report indicates that a large percentage of the patients had allergy, this condition was not even mentioned.

DIAGNOSIS OF ATYPICAL ALLERGY

Atypical nasal allergy may be defined as that type in which the symptoms and signs deviate from the characteristic picture. The failure to establish the diagnosis of this type of allergy is likely to result in the application of various local and surgical procedures without satisfactory relief of symptoms. The primary diagnosis may be temporarily obscured by the superimposition of the common cold. In hyperplastic and polypoid conditions chronic infection may appear to be the primary rather than the secondary factor.

Typical nasal allergy with the following characteristic symptoms and signs is easily recognized—sneezing, itching of the nose, profuse dis-

22. Persky, A. H.: Rhinorrhea in Children, with Special Reference to the Post-Tonsillectomized Child, Arch. Pediat. **53**:1, 1936.

23. Barnett, E. J., and Carnahan, H. D.: Nasal Allergy in Children, Arch. Otolaryng. **30**:247 (Aug.) 1939.

24. Gewanter, R.: Conservative Treatment of Sinusitis in Children, Arch. Otolaryng. **32**:728 (Oct.) 1940.

25. Kerley, C. G.: Sinusitis in Children from a Pediatric Standpoint, Arch. Pediat. **55**:732, 1938.

26. Crooks, J.: Nasal Sinusitis in Childhood, Brit. M. J. **1**:935, 1938.

27. Birdsall, S. E.: The Symptoms, Signs and Treatment of Nasal Sinusitis in Children, J. Laryng. & Otol. **54**:549, 1939.

charge, nasal obstruction, pallor and bogginess of the mucosa, the presence of eosinophils in the nasal secretions, often a cloudiness of the sinuses as seen in the roentgenogram and the absence of significant bacteriologic findings. The typical form, however, may be overlooked because of the intermittent character of acute exacerbations or because symptoms occur only at certain seasons of the year. In such instances the picture may be that of the common cold.

Atypical nasal allergy may not be recognized because the symptoms are not characteristic, the nasal mucosa may appear normal or somewhat red, the secretion may be scanty and eosinophils may not be readily demonstrated in the secretions.

Because of the fact that nasal allergy and sometimes cough in children not infrequently precede the onset of asthma, Clarke [20] emphasized the importance of establishing an accurate diagnosis in order that adequate allergic management may be established early and the onset of asthma possibly prevented.

When children present a history of frequent colds and bronchitis, the otolaryngologist or the pediatrician advises primarily the removal of the tonsils and adenoids. In these children the symptoms and signs may be typical or atypical. During the summer of 1938 Hansel and Chang [28] conducted a special study of 200 children who were routine candidates for removal of the tonsils and adenoids. Among this group a definite diagnosis of nasal allergy was established in 26 instances, or an incidence of 13 per cent. Six of the patients had hay fever. In only about 50 per cent were the symptoms and signs considered typical.

Although there are definite indications for tonsillectomy in a great many patients with respiratory allergy, this operation should not be performed primarily for the relief of allergic symptoms.

In an analysis of 341 cases of respiratory allergy observed in the pediatric allergy clinic at Washington University, the following interesting points were noted in relation to the tonsils and adenoids.[29] The 341 patients were classified into three groups: (1) perennial nasal allergy only, 52, or 15.2 per cent; (2) hay fever, hay fever and perennial nasal allergy and a combination of either of these with asthma, 129, or 37.8 per cent; (3) perennial nasal allergy and asthma, 160, or 47 per cent. We feel that the low incidence of pure nasal allergy in the first group is due to failure to establish the diagnosis of allergy. In this group 22 of 52 patients had had the tonsils and adenoids removed before coming under observation. In the second group of 129 patients there

28. Hansel, F. K., and Chang, C. S.: Relation of Allergy and Tonsillectomy in Children: Incidence of Respiratory Allergy in Cases of Routine Tonsillectomy, Arch. Otolaryng. **31**:45 (Jan.) 1940.

29. Hansel, F. K.: Allergy of the Upper and Lower Respiratory Tracts in Children, Ann. Otol., Rhin. & Laryng. **49**:579, 1940.

were 59 whose tonsils had been removed previously. In the third group of 160 patients, only 48 had undergone the operation. In the entire series 129 of 341, or 37.9 per cent of the patients, had been previously subjected to this operation. Of the 186 patients, 54.5 per cent, who had not undergone the operation, removal of the tonsils and adenoids was advised and performed in only 26, or 7.6 per cent.

In order to determine the incidence of colds in patients with respiratory allergy my co-workers and I found it necessary to study each patient for a period of at least one year, taking into consideration the symptoms, the nasal changes and the results of cytologic examination of the nasal secretions.

Atypical nasal allergy is often manifested in the form of individual, repeated or isolated, intermittent attacks which usually last only one to two or three days. Although the onset of an attack may simulate the common cold, the cessation is often sudden and complete. The diagnosis may depend entirely on the cytologic examination of the secretions. These patients often gave a family history of allergy or a personal history of previous or present nonrespiratory manifestations of allergy. Because of the irregular and intermittent pollination of the trees, this type of hay fever is not infrequently overlooked. In the central states, grass pollination is also irregular and intermittent, and at the peaks the pollination is much less than that of some of the trees. On the other hand, ragweed hay fever is so constant and violent that it is easily recognized.

Individual acute exacerbations of nasal allergy are not infrequently caused by ingestion of some unusual food or by contact with some unusual inhalant. Massive contact with foods or inhalants may cause symptoms, while a lesser degree of contact may produce subclinical symptoms. Isolated acute attacks may also be associated with exacerbations of some other type of allergy, especially that involving the gastrointestinal tract. The individual exacerbation must always be differentiated from the common cold.

One of the most common types of atypical nasal allergy is that in which the chief complaint is obstruction or stuffiness of the nose associated with little if any sneezing and practically no discharge. Whatever discharge is present drains postnasally. It is often thick and tends to stick on the soft palate or on the walls of the pharynx. A satisfactory specimen of secretion is difficult to obtain by blowing or by swabbing. The postnasal material, however, is adequate for cytologic examination. Because of the dryness of the mucosa there is a tendency to mild crusting, consequently there are usually a few neutrophils in the secretions. The eosinophilia is usually not marked, but sufficient to be of diagnostic significance.

These patients who complain of nasal stuffiness are often subjected to a submucous resection without relief. Cauterization, injection of escharotics or ionization gives temporary relief.

These low grade or subclinical symptoms in the nose are not infrequently associated with other manifestations of allergy.

In adolescence the physiologic hyperactivity of the mucosa may cause obstruction and increased discharge and must be differentiated from allergy. Nasal stuffiness of the nonallergic type may be caused by hypertension, hypothyroidism, syphilis or other inflammatory conditions.

Nasal allergy is often designated under the nomenclature of nonallergic vasomotor rhinitis, intumescent rhinitis or hypertrophic rhinitis.

The subclinical type of nasal allergy may be associated with other symptoms which dominate the picture, such as an obstruction of the eustachian tube, a chronic discharge through an old perforation of the drum membrane, a swelling of the soft palate, an involvement of the parotid gland or conjunctivitis. Frontal headache is common and may be the most predominant symptom. On account of poor nasal ventilation there is not infrequently a loss or reduction of the sense of smell.

Before allergy was recognized as a common cause of nasal disease, the aforementioned associated symptoms were usually attributed to ethmoiditis or sphenoethmoiditis, especially in those instances in which hyperplastic changes were present in the nose and paranasal sinuses. Radical surgical intervention was usually advised for the relief of symptoms.

REPORT OF ILLUSTRATIVE CASES

The following brief histories illustrate some of the problems frequently confronted in the diagnosis of allergy of the nose and paranasal sinuses. As will be noted, other conditions in the ear, nose and throat or other manifestations of allergy often dominate the clinical picture.

CASE 1.—Dr. J. E. F., aged 23, complained of burning and itching of the eyes for two years, which was not relieved by eye drops. The conjunctivas were slightly injected. The only nasal complaint was mild stuffiness. The nasal mucosa did not show definite changes, but the ocular and nasal secretions contained eosinophils. The symptoms were relieved by dust therapy.

This case illustrates the importance of recognizing allergic conjunctivitis and its possible association with mild allergy.

CASE 2.—C. B. S., a man aged 58, had occasional colds and soreness of the throat. On a recent occasion he had an attack which appeared to be acute rhinitis. The mucosa did not appear particularly abnormal. The secretion was mucoid and thick. The symptoms had been present for about twenty-four hours. Cytologic examination of the secretions showed practically all eosinophils. On the oral administration of ephedrine the attack completely subsided within three days. The patient had some small areas of chronic eczema on the hands.

This case is an example of an isolated acute attack of allergic rhinitis, occurring in a person with no chronic nasal symptoms.

Case 3.—Mrs. D. W., aged 39, complained of nasal discharge, sneezing and obstruction of two weeks' duration, simulating the common cold. She gave a history of nasal stuffiness and occasional sneezing for one year. The nasal mucosa was pale; the secretion, profuse and mucoid, containing a large number of eosinophils. The skin reactions were all negative, but after the injection of house dust extract the symptoms completely subsided within a week.

Unless the diagnosis is accurately established in this type of case, the condition may be treated as a common cold.

Case 4.—J. W., a girl aged 6 years, reported for examination on March 30, 1940, with nasal symptoms simulating an acute cold of three days' duration. The nasal mucosa was somewhat pale, and the secretions were profuse and mucoid, with many eosinophils present. The acute attack was coincident with a high atmospheric concentration of elm pollen. Skin tests showed positive reactions to elm, maple and poplar pollen. Relief was obtained from intracutaneous pollen therapy.

This case illustrates the importance of differentiating an acute attack of nasal allergy from the common cold and further emphasizes the value of pollen counts and skin tests in making a diagnosis of hay fever.

Case 5.—A. G. N., a man aged 35, suffered from frontal headache and nasal obstruction; there was no sneezing, but a postnasal discharge was present. The mucosa was very boggy and only slightly pale. There had been a submucous resection without relief. The nasal discharge was very scanty. The diagnostic eosinophilia was found only after repeated cytologic examinations. Relief of symptoms was consequent on dust therapy. There were positive skin reactions to house dust and feathers; all other tests were negative.

Case 6.—A. P. R., a man aged 47, complained of nasal stuffiness for two years, with no discharge or sneezing. The nasal mucosa was boggy but had a red color. There was a small but significant number of eosinophils in the nasal secretion. There was no response to dust therapy. The patient had mild gastrointestinal symptoms, consisting of gas and belching. Milk and oranges caused these symptoms. Avoidance of these foods resulted in complete relief of the nasal stuffiness. There were small borderlnie skin reactions to dust, wheat, ozite, celery and spinach.

Case 7.—Mrs. G. K., aged 47, had nasal symptoms of sneezing, obstruction and discharge since childhood. On first observation she complained of pain over the right antrum and discharge from the right side of the nose of four weeks' duration. Her nose showed a marked obstruction in the right middle meatus from a deflection of the septum. The discharge appeared to be mucopurulent, but the microscopic examination showed marked pure eosinophliia. In other words, the secretion was eosinophilic pus. Although this condition appeared to be an acute infection, it proved to be the result of an acute allergic reaction with retention of secretion in the antrum on the side on which there was definite obstruction to drainage and ventilation.

Case 8.—E. F. S., a man aged 35, had had a chronic discharge from the right ear since childhood, also a nasal discharge and cough. There was a large perforation of the right drum membrane with mucopurulent discharge. The condition of the nasal mucosa was not typical of allergy. Many eosinophils were noted in the nasal secretion. There was a positive skin reaction to house dust; all the other tests wre negative. The nasal symptoms and cough were relieved after dust therapy. The right ear cleared up on local treatment and care in blowing the nose.

CASE 9.—Dr. C. L. R., a man aged 32, complained that he had had chronic nasal obstruction and moderate discharge since childhood, worse in winter. There was no sneezing. There was more or less constant obstruction of the eustachian tubes. He had had no relief after submucous resection. The nasal mucosa was boggy but only slightly pale. The secretion was thick with a moderate number of eosinophils. Skin tests showed borderline reactions to a few foods and inhalants. There was marked relief of the nasal and aural symptoms following dust therapy.

This case illustrates the futility of a submucous resection in giving relief for nasal obstruction and aural symptoms.

CASE 10.—Mrs. O. DeB., aged 49 years, had had acute attacks of recurring unilateral and bilateral swelling of the parotid gland of two years' duration. The attacks usually followed the ingestion of foods, especially acid foods. There was no pain, and the swelling usually lasted from one to three days. These attacks were accompanied by itching and redness of the hands and feet. A mucus plug expressed from Stenson's duct during an attack of swelling showed a very large number of eosinophils. The patient had mild chronic nasal stuffiness, but no abnormal nasal changes. A few eosinophils were found in the nasal secretions.

This case illustrates the importance of recognizing allergy of the parotid gland.

CASE 11.—Miss V. R., aged 35, complained of pain in the right tonsillar region, a sense of swelling in the throat, fulness in the ears and the occurrence of frequent colds. The nose showed a pale boggy mucosa and an edema of the soft palate. The pain in the throat, the fulness in the ears and throat and the edema of the palate subsided under allergic management.

In this case the patient's primary complaints were directed to the throat and ears rather than to the nose.

CASE 12.—C. K., a woman aged 34, was seen on two occasions with mild attacks of what appeared to be the common cold. There were no characteristic changes in the nasal mucosa. The secretion was clear and contained a few neutrophils. She had a history of mild chronic nasal stuffiness and an annoying postnasal discharge, also some cough and sense of tightness in the chest, but no wheezing. On a later occasion a large mass of gelatinous postnasal secretion was found to contain a great number of eosinophils. Skin tests with the common foods and inhalants were negative. She had complete relief of symptoms, however, after a few injections of stock house dust. She had been free of symptoms for six months with no further treatment.

In this case the symptoms were very vague. The eosinophilia of the secretions was noted only in the postnasal discharge. This was the only definite means of establishing a diagnosis.

CASE 13.—U. S. D., a man aged 50, complained of hoarseness, cough and bloody expectoration of six months' duration. There were mild nasal stuffiness and postnasal discharge. The nasal mucosa was boggy and slightly pale. There were eosinophils in the basal and bronchial secretions. Many superficial small veins were noted in the pharynx. All symptoms disappeared under allergic management.

Mild nasal stuffiness and cough are not infrequently of allergic origin. The bleeding in this case occurred as the result of coughing trauma.

CASE 14.—Mrs. J. F., aged 49, complained of sneezing, nasal obstruction and discharge, accompanied by cough and mild wheezing. She also had symptoms of indigestion (gas, bloating and cramps). A complete medical examination was made previously by an internist, who diagnosed the gastric condition as a neurosis.

The patient, however, stated that the ingestion of certain foods excited the gastric symptoms. She had polypoid changes in the nose and eosinophils in the nasal and bronchial secretions. Relief of all symptoms followed allergic management.

In cases of this type the allergic nature of the gastrointestinal symptoms is often overlooked in spite of the presence of respiratory allergy.

CASE 15.—H. E., a man aged 19 years, suffered from an acute attack of urticaria and angioneurotic edema followed by joint symptoms such as those seen in serum disease. About two weeks after these symptoms subsided, he returned with sneezing, nasal obstruction and discharge, stating that he had a cold. The nasal mucosa was boggy and pale, and the secretion contained a very large number of eosinophils.

This case illustrates the acute onset of nasal allergy following urticaria and angioneurotic edema and emphasizes the importance of distinguishing it from the common cold.

COMMENT

On the basis of our observations, as well as those of leading observers, it is evident that typical and atypical allergy in the upper respiratory tract may be overlooked if adequate care and time are not directed to the establishment of the diagnosis. A correlation of the clinical history, the local findings and the cytologic examination of the secretions establishes the diagnosis in most cases. Further consideration, however, must be given to roentgen, bacteriologic and other laboratory procedures.

In children allergy of the upper respiratory tract is often overlooked, and such patients are frequently subjected to removal of the tonsils and adenoids for the relief of frequent colds and bronchitis thought to be of infectious origin. As a result, the allergic nature of the symptoms is not recognized until asthma develops.

Hay fever, especially the tree and grass types, is frequently overlooked and erroneously diagnosed as a spring or a summer cold.

Likewise, the exacerbation of nasal allergy which simulates the common cold in its symptoms often cannot be definitely diagnosed except on the basis of the cytologic examination of the nasal secretions for eosinophils.

Patients with nasal obstruction, obstruction of the eustachian tube and deafness due to allergy are often subjected to submucous resection without relief of symptoms.

The atypical type of nasal allergy is often obscured by the prominence of some other condition in the clinical picture, such as a discharge from the ear, a swelling of the parotid gland, a swelling of the palate, frontal headache, cough and other associated conditions or manifestations of allergy.

Case Reports

SOLITARY NEUROFIBROMA OF THE PHARYNX

COLBY HALL, M.D., AND HAROLD OWENS, M.D., LOS ANGELES

Solitary neurofibroma of the pharynx is one of the rarest tumors ever to be encountered by a laryngologist. Figi,[1] in his report of a case published in 1933, stated: "A review of the literature has failed to reveal another case of solitary neurofibroma primary in the pharynx similar to that presented here." Since that time no additional cases have been reported.[2] The rarity of the condition is evidenced by the fact that the case of Figi and the case to be presented here are the only ones recorded in the literature.

REPORT OF A CASE

A white man aged 57 presented himself at the laryngologic clinic in November 1940. He complained of an increasing swelling in the region of the right tonsil, which was beginning to produce some dysphagia. The swelling had been first noted eight months previously. The remainder of the patient's history was irrelevant.

Examination revealed an extreme prominence of the right peritonsillar region, which pushed the tonsil medially. This prominence was very firm, extended almost to the midline and displayed no signs of inflammatory reaction. Otherwise the ears, nose and throat, as well as the general physical condition were quite normal.

This unilateral lesion of the tonsillar and the peritonsillar region suggested neoplasm, granuloma or blood dyscrasia. The hemogram revealed nothing abnormal, and the Wassermann, the tuberculin and the coccidioidin tests all gave negative results. Roentgenograms of the chest revealed no pathologic condition. It was deemed necessary to remove a section of tissue for microscopic examination. To accomplish this a tonsillectomy on the right was required.

Tonsillectomy and Removal of Tissue for Biopsy.—After removal of the right tonsil it was apparent that the pharyngeal prominence was due to a tumor pushing medially and obliterating the tonsillar fossa. A section of the mass was removed through the tonsillar fossa.

The tumor tissue was reported as granuloma, while the tonsil displayed only chronic inflammation when examined microscopically.

Postoperatively there was a rapid growth of pale granulation tissue over the surface of the tumor, giving the appearance of carcinoma (fig. 1).

Another section was removed for biopsy, and the report was: neurofibroma. Microscopic examination revealed many areas typical of neurofibroma. There were scattered areas which showed the palisade-like and parallel, ribbon-like arrangement of elongated nuclei. Occasional large vacuolated phagocytic cells were seen in the degenerated areas. These were the so-called foam cells. Com-

From the Departments of Anatomy and Otolaryngology of the University of Southern California School of Medicine.

1. Figi, F. A.: Solitary Neurofibroma of the Pharynx, Arch. Otolaryng. **17**:386 (March) 1933.

2. Since this paper was written, a similar case has been reported by Dr. Fred E. Motley, of Charlotte, N. C. (Motley, F. E.: Position Malignancy, Arch. Otolaryng. **34**:771 [Oct.] 1941).

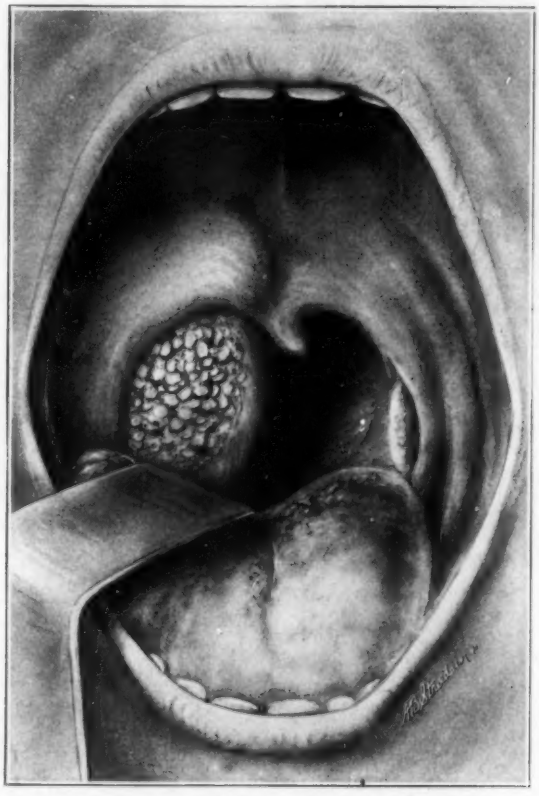


Fig. 1.—Appearance of the tumor and the pharynx following the tonsillectomy and the first biopsy. Note the overgrowth of granulation tissue which gave the appearance of a carcinoma.

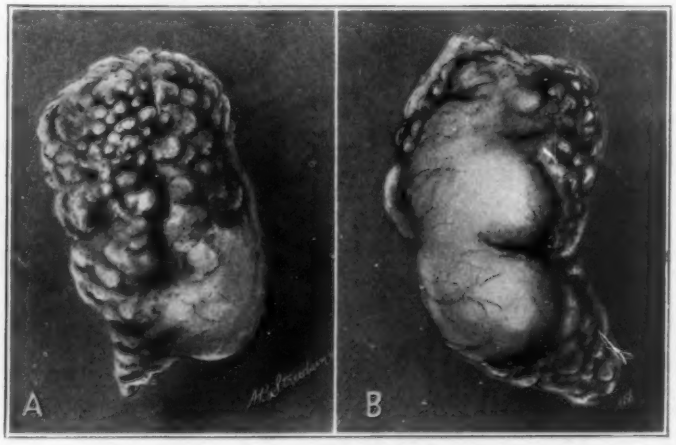


Fig. 2.—Gross appearance of the tumor after removal: *A*, the oral, or presenting, surface; *B*, the posterior, or attached, surface.

parison with a section of a known neurofibroma of the brachial plexus revealed definite similarity. The tumor of the pharynx displayed fewer typical palisade areas and a very much looser stroma. These features probably indicated marked degeneration.

Removal of the Tumor (Feb. 19, 1941).—With the patient under intratracheal anesthesia, the external carotid artery was ligated, and the tumor mass was removed intraorally. It measured 7 by 4.5 cm. It extended from above the level of the uvula well into the hypopharynx. Its exact point of origin could not be determined, but it was found to be very firmly attached along its posterior surface. After delivery of the tumor, the denuded fibers of the anterior vertebral muscles were plainly seen, lying on the vertebrae. Fortunately, bleeding was not particularly troublesome.

Grossly, the tumor was firm, reddish yellow and encapsulated, and on section it showed many areas of degeneration.

The patient's convalescence was uneventful, and at the time of writing (June 1941) he is back at work and is enjoying good health. His pharynx has healed with very little deformity.

COMMENT

The diagnosis in a case of this type can be made only by the pathologist, and even he admits that there may be room for controversy over the microscopic picture.

The histologic appearance in this case conformed most closely to that described by Penfield [3] in his account of solitary neurofibromas. He stated that these tumors arise from the sheaths of nerves or from the nerve roots, and that when they are situated peripherally they attain much larger proportions than when they are located centrally, as on the acoustic nerve. Figi, in quoting Penfield, pointed out that many names have been attached to tumors of this type. These are "solitary neurofibroma," "schwannoma," "fibroma of the nerves," "gliofibrosarcoma," "peripheral glioma," and "tumor of the nervus acusticus." To this entire group Penfield has given the name "perineurial fibroblastoma."

A correct diagnosis is of the utmost importance from a therapeutic as well as from a prognostic standpoint. A tumor of the type described here can be removed in toto, is encapsulated and has no tendency to recur.

We have employed the term "solitary neurofibroma" because this is the name used by Figi in the first, and only other, report of a case of this nature to be found in the literature.

SUMMARY

A case of solitary neurofibroma of the pharynx, called also perineurial fibroblastoma, is reported because of its extreme rarity, because of the problem of differential diagnosis which it presents and because it may be of aid to other laryngologists who will perchance encounter such a pathologic lesion.

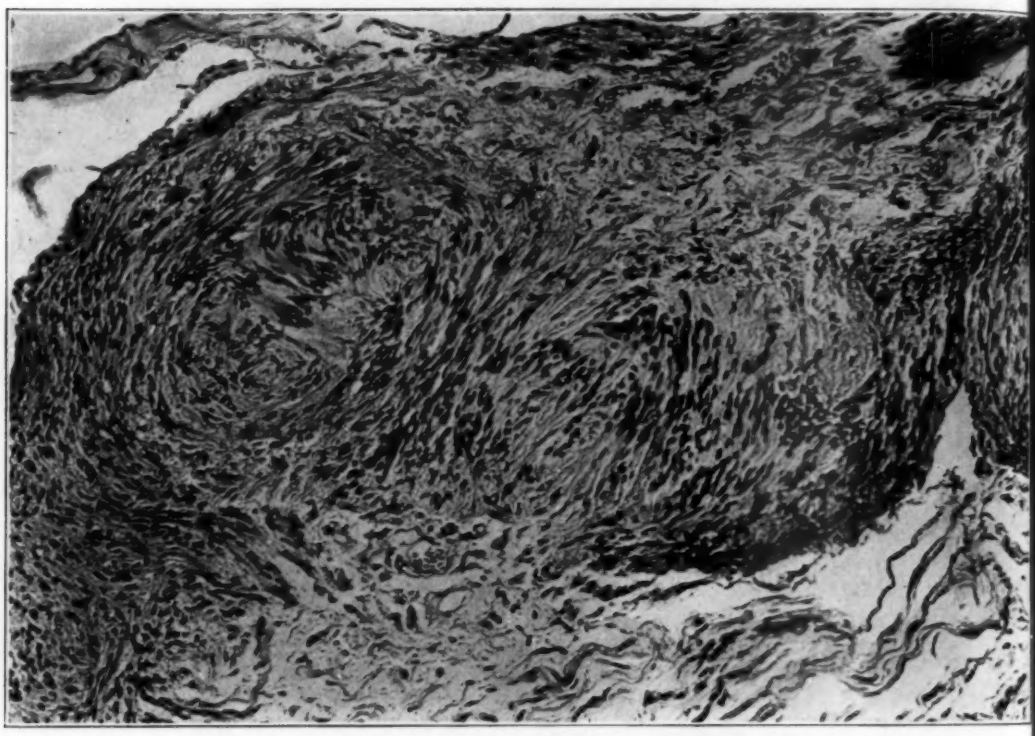
1136 West Sixth Street.

3. Penfield, W.: The Encapsulated Tumors of the Nervous System, Surg., Gynec. & Obst. **45**:178 (Aug.) 1927.

SCHWANNOMA OF THE MOUTH

GEORGE M. COATES, M.D., PHILADELPHIA

The publication in this issue of the ARCHIVES OF OTOLARYNGOLOGY (page 1165) of a most interesting report of a case of solitary neurofibroma of the pharynx, by Hall and Owens, of Los Angeles, prompted this presentation of a case of schwannoma of the mouth. The term "schwannoma" is used because the pathologist who made the diagnosis reported the growth as schwannoma, although histologically a tumor of



Photomicrograph of a section of schwannoma of the mouth, from patient B. A.

this type is considered identical with neurofibroma or neurinoma and may be found on any peripheral nerve anywhere in the body. From the dearth of reports, such a lesion apparently has rarely been found located in the pharynx or mouth, and therefore the case herein described should be put on record.

REPORT OF A CASE

Mrs. B. A., 44 years of age, had been under my observation for a number of years for progressive deafness. After an absence from the office of six months, she appeared on April 12, 1940, complaining of a painless lump in the right side of the mouth, beneath the tongue. This was first noticed four weeks previously

and had rapidly increased in size. A smooth round mass could be seen under the right side of the tongue, about 2 inches back of the frenum. It seemed circumscribed, was firm to palpation, was not tender, lay apparently just below the mucous membrane and was loosely attached to surrounding structures. Puncture with a needle ruled out the possibility that the growth was a cyst; so the mucosa was slit, with the idea of taking a specimen for biopsy. As soon as the mucous membrane over the tumor was incised, the latter literally popped out into the mouth, so loosely was it attached, and was easily removed in toto with a tonsil snare. There was no pain or bleeding. The wound was left untreated and promptly healed, and there has been no recurrence to date. The specimen was sent to Prof. John A. Kolmer, who pronounced it schwannoma and advised that the case should be reported because of its apparent rarity. He said that Smith and Gault, in their "Essentials of Pathology," and Ewing, in his "Neoplastic Diseases," described tumors such as this under the terms "neuroma" and "neurinoma."

The following description of the tumor, which was spherical, about 2 cm. in diameter and enclosed by a definite capsule, was prepared by Dr. Lawrence W. Smith, professor of pathology at Temple University School of Medicine.

"Specimen received April 12, 1940: a tumor from the mouth.

"Microscopically, the specimen appears to consist of a plexiform mass of tumor tissue of neurogenic origin embedded in a delicate connective tissue stroma. The latter shows considerable edema and is fairly well vascularized with small capillary vessels. The tumor tissue itself presents the characteristic features of that group of neoplasms arising from peripheral nerves. The emphasis in this instance seems to be on the particular origin from the Schwann cells of the perineurium. The cells for the most part are elongated spindles which show a striking tendency in places to be arranged in palisade form. The nuclei vary considerably in size and shape. The majority of them are spindled. Some of the less mature ones are ovoid. Most of them show an increase in chromatin. No mitotic figures are observed, and there is no apparent invasion of the surrounding structures. The tumor belongs to the group of neoplasms arising from peripheral nerves which are generically included under the term 'neurofibroma.' More specifically, because of the histologic appearance of the cells, my associates and I feel that this particular tumor might more properly be termed a schwannoma.

"From the prognostic standpoint, it is not at all improbable that a lesion such as this will recur, as its possible complete surgical excision is somewhat problematic. On the other hand, on the basis of its present histologic appearance, it cannot be considered a truly malignant lesion.

"The diagnosis is: schwannoma."

The photomicrograph was prepared by Dr. Edwin S. Gault, of Temple University.

LYMPHOMA OF THE LARYNGOPHARYNX

CHARLES J. IMPERATORI, M.D., NEW YORK

The case to be reported is of interest because of the rather uncommon type and location of the tumor and its occurrence in a patient in his seventh decade:

REPORT OF A CASE

Mr. R., 71 years old, was first seen by me on Oct. 14, 1940, referred by Dr. W. T. Heldmann and the patient's son, Dr. O. W. Race, of Staten Island, N. Y. For the past year he had experienced considerable difficulty in swallowing and was troubled with regurgitation of food and severe paroxysms of coughing. Recently, there had been some wheezing. There had been occasional attacks of dyspnea at night. There was no expectoration of blood or mucus. Physical examination of the heart and lungs revealed nothing abnormal. The blood was normal; the

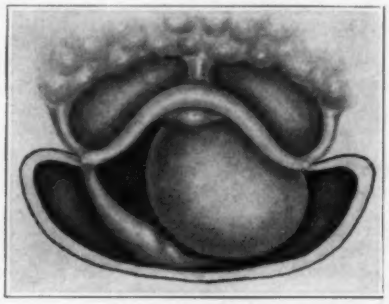


Fig. 1.—Laryngoscopic view of the tumor.

sedimentation rate was normal. The urine contained a faint trace of albumin and a few hyaline casts. The Wassermann reaction was negative. An electrocardiogram and a roentgenogram of the chest and mediastinum revealed normal conditions. Laryngeal examination showed a rounded mass occupying the introitus of the larynx and attached by a broad pedicle to the left aryepiglottic fold. The report of the roentgen examination of the larynx was as follows: "Extending downward from the base of the epiglottis there is a somewhat ovoid shadow suggesting the presence of a tumor mass. This mass has apparently pushed the base of the tongue forward and lies chiefly below the hyoid bone and projects downward a distance about two thirds of the larynx. The retropharyngeal space seems about normal." The surface of the mass was dark red and smooth and gave one the impression that the contents might be soft. When the patient coughed, the mass could be extruded from the laryngeal introitus. The airway was mostly in the posterior commissure and part of the right posterior portion of the laryngeal aperture. No enlarged lymph nodes were palpable in the neck or the axilla.

Read at the Sixty-Third Annual Meeting of the American Laryngological Association, Atlantic City, N. J., May 29, 1941.

Tentatively, the diagnosis was that of a retention cyst, a branchiogenetic cyst, a fibrolipoma or, remotely, a malignant tumor. Removal of the growth by suspension laryngoscopy or by thyrotomy was proposed. However, it was felt that if thyrotomy was employed there would be better hemostasis and an opportunity for better inspection of the pedicle. The latter procedure was carried out on Oct. 21, 1940.

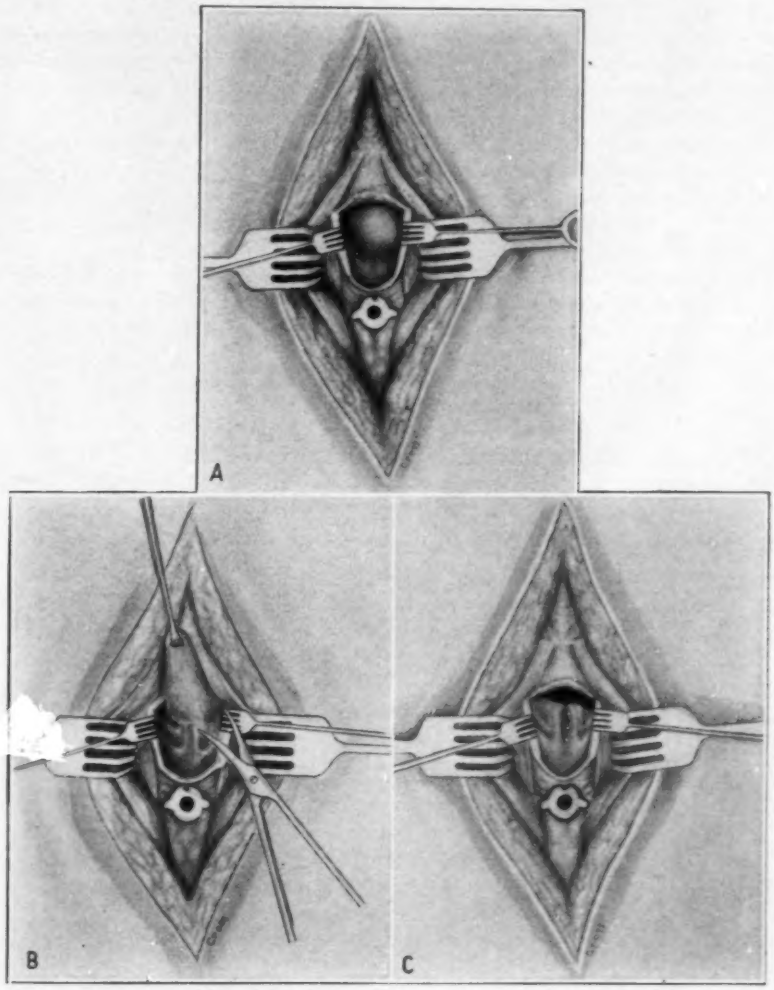


Fig. 2.—*A*, exposure of the tumor by laryngofissure; *B*, tumor grasped and pulled into the split larynx, so that the pedicle is tense; *C*, laryngeal introitus after the removal of the tumor.

It was preceded by a tracheotomy and placement of a small tube in the incised cricotracheal membrane. Local anesthesia was employed. The exposure of the growth and pedicle was satisfactory, and the growth was removed with its attach-

ment close to the arytenoid cartilage and the epiglottis. There was controllable bleeding, and at the completion of the operation the tracheotomy tube was removed and the incision closed. Because of a subcutaneous emphysema following an attack of coughing within eight hours after the operation, the wound was opened and the tracheotomy tube reinserted. The tracheotomy tube was removed on the second postoperative day and the subcutaneous emphysema had been absorbed on the fifth day.

The report from the pathologist was as follows: "The tumor is firm and yellowish gray and appears to be quite cellular. Section shows that it consists of a diffuse mass of lymphoid cells, some of which are large, with large reticulated nuclei, and some of which show active mitosis. There is very little tendency to structural formation, and there is considerable tendency to infiltrate the wall, blood vessels and the connective tissue trabeculae. There is not an abundance of connective tissue present. There is a surface of stratified squamous epithelium, which is well differentiated in the lymphoid tissue. Diagnosis: lymphoma with lymphosarcomatous changes."

On the seventh postoperative day the patient left the hospital. At the time of writing he has gained 10 pounds (4.5 Kg.) in weight, and his appearance is that characteristic of a man of his age in exceptionally good health. At some future date a further report will be submitted.

The first clinical contribution made before this organization was a report of a similar case by Dr. F. J. Knight, of Boston, in 1879.[1]

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1. Knight, F. J.: Retropharyngeal Sarcoma, Tr. Am. Laryng. A. **1**:204, 1879.

MYCOTIC INFECTION OF THE THROAT

JOHN J. SHEA, M.D., MEMPHIS, TENN.

Mycotic infections of the lungs are more frequently diagnosed in our modern hospitals than are like infections of the throat. Yet it cannot be true that the one region is affected more frequently than the other. During the past ten years I have twice encountered conditions proved to be angina which resulted from fungous infection, and during that period internists working among the same group of patients have recognized each from 2 to 6 cases of pulmonary infection. In an advanced stage mycotic infections are manifested as granulomas and must be differentiated from syphilis and tuberculosis of the upper air passages and mouth. Gill [1] read before the American Academy of Ophthalmology and Otolaryngology a comprehensive thesis on mycotic infections of the respiratory tract which should arouse interest in this subject.

Bacteriologists [2] have studied yeastlike fungi and attempted to classify those capable of producing lesions in man. The ulcerations of late carcinoma and tuberculosis are usually contaminated with these yeastlike fungi, but mycotic infection of the throat is presented here as a disease entity.

LABORATORY METHODS

When angina is suspected of being of fungous origin, it is practical to send the patient directly to a laboratory for fresh smears. My routine is to study a fresh specimen with and without the addition of a solution of sodium hydroxide. Cultures are planted on the various Sabouraud mediums and allowed to grow at room temperature for four weeks.

The serologic method of differentiation assists in identifying general groups, but I have been more fortunate in determining the type by skin tests. A heat-killed suspension of a known fungus is applied to the skin by the scratch method or by intracutaneous injection. When the contaminating fungus is used, an area of erythema will appear in fifteen to twenty minutes. The rapidity of this method makes up for its possible errors. The complement [3] fixation tests are reliable in the differ-

Read at the Sixty-Third Annual Meeting of the American Laryngological Association, Atlantic City, N. J., May 29, 1941.

1. Gill, W. D.: Mycotic Infections of the Respiratory Tract, Tr. Am. Acad. Ophth. (1940) **45**:108-119, 1941.

2. Benham, R. W.: Certain Monilias Parasitic on Man: Their Identification by Morphology and by Agglutination, J. Infect. Dis. **49**:183-215, 1931. Shrewsbury, J. F. D.: The Genus Monilia, J. Path. & Bact. **38**:313-354, 1934. Martin, D. S.; Jones, C. P.; Yao, K. F., and Lee, L. E., Jr.: A Practical Classification of the Monilias, J. Bact. **34**: 99-129, 1937.

3. Martin, D. S., and Smith, D. T.: The Laboratory Diagnosis of Blastomycosis, J. Lab. & Clin. Med. **21**:1289-1296, 1936.

entiation of infections due to Blastomyces, but I have never used them in the isolation of Monilia.

The bacterial flora abounds in a variety of organisms, with Proteus and Staphylococcus aureus the most common. Proteus manifests itself by the production of a profuse glairy mucus, and the staphylococcus by marginal lesions and cutaneous blebs.

Smith [4] gives the following classification of fungi which produce infections of the lungs:

I. Yeastlike fungi
   1. Saccharomyces
   2. Monilia
   3. Torula
   4. Endomyces
   5. Geotrichum (Oidium)
   6. Blastomyces
   7. Coccidioides immitis
   8. Sporothrix

II. Moldlike fungi
   9. Aspergillus
   10. Penicillium
   11. Mucor

III. Higher bacterial forms
   12. Actinomyces
   13. Nocardia
      (a) acid-fast
      (*b*) non-acid-fast

PATHOLOGY

Torula produces indolent nodules in the mouth and throat, which slough into ulcers. The thrush of an infant's mouth is caused by a fungus of the Oidium group, and the warty tough harmless excrescences found on the tonsils contain Streptothrix.

The angina produced by a fungous infection is the result of granulomatous lesions, and a biopsy specimen abounds in round cells, with an occasional yeastlike body. The process advances, melts and recedes, to heal with scars similar to the granulomas of syphilis and tuberculosis.

DIFFERENTIAL DIAGNOSIS

The lesion on the palate and tonsillar pillars lacks the symmetry of that of secondary syphilis and the odor of that present in Vincent's angina. The tertiary lesion (gumma) occurs most frequently in the soft palate, and the ulceration spreads posteriorly into the nasopharynx. The anterior aspect is red and swollen, but the mucous membrane resists until the mass has suffered a through and through necrosis. The progress of a fungous infection begins with an irritation on the surface; this is followed by ulceration into the deeper tissues, with destruction as the process advances. Cicatrization takes place as soon as the healing commences. There is nothing characteristic in the scarring which results from tuberculosis, syphilis, fungous infection and chemical destruction to distinguish one disease from the other unless adjacent bones are involved, which occurs more commonly in syphilis.

4. Smith, D. T.: Diagnosis and Treatment of Common Fungus Infections of the Lungs, Nat. Tuberc. A. Tr. **29**:76-79, 1933. Martin, D. S., and Jones, C. P.: Further Studies on the Practical Classification of the Monilias, J. Bact. **39**:609-630, 1940. Martin, D. S., and Smith, D. T.: Blastomycosis, Am. Rev. Tuberc. **39**:275-304, 1939.

In a case in which the presence of a mycotic infection is suspected, biopsy is not a satisfactory procedure. Theoretically, the study should reveal the fungi in the lesion, but practically the lesion in syphilis, tuberculosis or mycosis is a wild growth of round cell infiltration. There is no therapeutic test, as the administration of potassium iodide improves both conditions.

TREATMENT

Potassium iodide is the best therapeutic agent, because the fungus lesion is a granuloma, and the drug should be given to the full saturation of the individual patient.

Thymol is a valuable alternate and is best given in an enteric-coated pill or in a capsule, in doses of 15 grains (0.97 Gm.) three or four times a day.

Sodium benzoate has proved its value in the preservation of food products, such as catchup, and may be given in doses up to 1 drachm (3.88 Gm.) a day. I have administered this drug intravenously in dilutions of 1:1,000, with satisfactory results. Because of the therapeutic uncertainty involved in the use of these drugs, it is my practice to alternate them once a month, but when the lesion appears to be spreading, I prefer to return to the use of a solution of potassium iodide. Gargling of hydrogen peroxide before meals and of a 1 per cent solution of acetic acid after meals will keep the mouth and throat clean. The various fungicides may be applied locally to the lesions. The intravenous injection of 1,000 cc. of a 5 per cent dextrose solution daily satisfies the deficiency in the patient's diet.

Roentgen therapy applied locally to the lesions during the active stage retards spreading, and the application of water-cooled ultraviolet rays or direct sunlight assists in healing the lesions.

The uncertainty involved in the use of this type of medication is a proof of the deficiency of present therapeutic knowledge in combating infections caused by these yeastlike fungi.

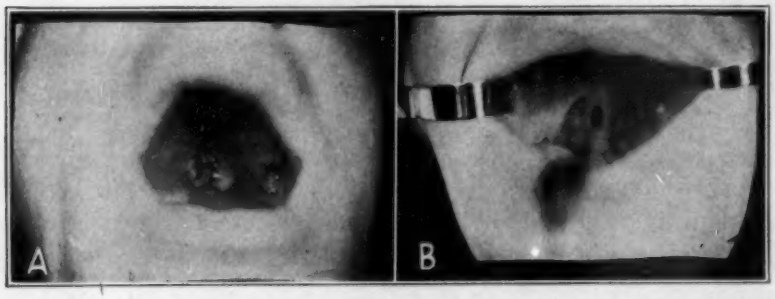
REPORT OF A CASE

Mr. W. B. McC., aged 46, was first seen and treated by Dr. James E. Hayes, of Brownsville, Tenn., for an unusual lesion attacking the pillars of the right tonsil. Because there was a history of syphilis, though the Wassermann test was negative, the patient was given thorough antisyphilic therapy. Dr. Frank W. Smythe, of Memphis, Tenn., studied the patient for a possible malignant condition, and the tissue removed was judged by Dr. Nolan E. Leake, of the laboratory of the Baptist Memorial Hospital, Memphis, Tenn., to be nonmalignant. The lesion continued to spread, and when I first saw the patient, on June 25, 1940, the granuloma included both tonsils, the uvula and the visible walls of the nasopharynx and by indirect inspection was seen to involve the base of the tongue and the larynx and to extend down into the trachea. The patient's general condition was fair in spite of his restricted ability to swallow anything but liquids. Strangling and coughing were the usual results of taking liquids. The absence of pain in the presence of so extensive a lesion was remarkable. The Wassermann test was found again to be negative. A biopsy was reported as showing no malignant growth but a tissue composed of a wild growth of round cell infiltration. A roentgenogram of the chest revealed "a rather marked accentuation of the hilar

shadow on both sides and a generalized increase in the peribronchial markings of the lower lobes of both lungs, more marked on the right than on the left. There was considerable peribronchial fibrosis on each side, and the condition revealed by a roentgenogram was suggestive of a fungous infection."

Dr. I. D. Michelson, of the University of Tennessee, studied a specimen in an effort to determine the possibilities of the presence of a fungus. He isolated Monilia albicans, contaminated by a bacterial growth of Proteus, Staph. aureus and hemolytic streptococcus.

Treatment and Progress.—Iodides were administered, the lesion treated by roentgen therapy and the mouth cleansed before meals with hydrogen peroxide and after meals with 1 per cent acetic acid. The lesions were painted daily with an alcoholic solution of gentian violet medicinal NNR. The patient was given intravenously 1,000 cc. of a 5 per cent solution of dextrose every day. In spite of this, the granuloma continued to spread deeper, and at the end of a month thymol was substituted for the iodides. During the third month 1 drachm (3.88 Gm.) of sodium benzoate was given daily. After the third month of medication the lesions were arrested and a stage of scar formation began. The uvula and



A, lesions fusing, ultimately to strangulate the uvula. *B*, end results. The uvula is gone and the posterior tonsillar pillars are bound down to the pharynx.

the pillars of the tonsils sloughed away, so that with complete healing the remains of the posterior pillars were fixed to the pharynx in the midline, leaving only a small aperture the size of a pencil for nasal respiration. This small airway did not embarrass the patient, and he could sleep with his mouth closed. During the eighth month a new area of infection developed in the mucous membrane covering the hard palate and rapidly spread to include the edentulous alveolar process. Six weeks of iodide therapy was required to arrest this new lesion. During the first six months of observation numerous pustules resembling pemphigoid lesions appeared over the extremities, which were treated with the same general therapy. Necrosis of the bony palate did not occur at any time.

The second roentgenogram of the lungs, taken Nov. 15, 1940, was reported as showing an improvement, and a third examination, on March 28, 1941, demonstrated a lessening of the disease process.

SUMMARY

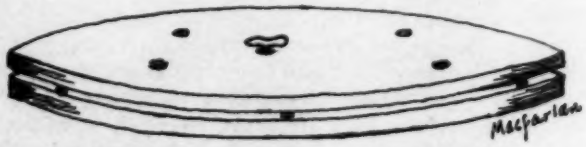
This case is reported to stimulate interest in the possibility that some of the granulomas of the mouth and throat that are neither syphilitic nor tuberculous may be the result of infection with yeastlike fungi.

Clinical Notes; New Instruments and Technics

A TURNTABLE FOR BÁRÁNY TESTS

DOUGLAS MACFARLAN, M.D., PHILADELPHIA

There is nothing more ugly and awkward around an office than the seldom used Bárány chair. The following is suggested as an inexpensive substitute: Two circular boards 3 feet (91.5 cm.) in diameter, fitted with four ball casters and held together by a center pin. Four holes in the upper board are deep enough to hold the legs of a straight-backed chair. The chair can be immediately removed after the test, and the turntable can be conveniently set aside by standing it on edge against the wall.



A turntable for the Bárány test. Two circular boards are seen, the top one revolving on the bottom one. Both are held together by a fixed center pin and thumb bolt. Four ball-bearing casters are placed between the boards.

SUGGESTED ADDITIONAL USES OF THE RUBBER SPONGE IN OTOLARYNGOLOGIC PRACTICE

CORNELIUS E. HAGAN JR., M.D., FALL RIVER, MASS.

Recent communications[1] have described the uses of rubber sponge in the field of otolaryngology. Certain additions should be made to this growing list because the use of rubber sponge makes possible ease of manipulation, increased comfort of the patient, reduction of the operating time and more constant results.

As practically every major rubber company is making some type of rubber sponge, and as there are increasing numbers of commercial uses for rubber sponge, the sponge can be obtained in various thicknesses and densities. For use by otolaryngologists the sponge should be easily compressed (i. e., of low density), of neutral color, about ½ inch (1.27 cm.) thick for most applications and with very small bubble formation. These small bubble sponges are usually smoother on one side than on the other; but neither side, because of the extremely small size of the bubbles, is actually rough.

1. (*a*) Figi, F. A.: Stenosis of the Larynx, Ann. Otol., Rhin. & Laryng. **49**:394-409 (June) 1940. (*b*) Holden, W. H.: Injuries of the Auricle, S. Clin. North America **21**:367-370 (April) 1941. (*c*) Hagan, C. E., Jr.: Secondary Endaural Grafting of the Radical Mastoid Cavity, Arch. Otolaryng. **34**:1029 (Nov.) 1941.

Sponge of this character can be purchased directly from the manufacturer in sheets of various lengths, widths and thicknesses, as well as in various degrees of density. The one-half inch thickness is easiest to handle and is most adaptable to uses in otolaryngologic practice. Because difficulty is sometimes encountered in readily obtaining suitable sponge rubber, it is well to know that the national chain five and ten cent stores stock sponge rubber in the form of rubber powder puffs. The powder puff measures 2½ inches (3.81 cm.) across and is ½ inch in thickness, a size suitable for the various purposes to be mentioned. The sponge may be sterilized by boiling.

RUBBER SPONGE NASAL PACK

Many types of nasal packing have been advocated for the fixation of the septum following submucous resection. The ideal type would be a method allowing firm fixation without blockage of the nose, permitting, therefore, unimpeded nasal drainage and normal nasal respiration. It is possible to breathe through "airfoam type" sponge an inch thick when held in front of the nose, and so it was thought that this sponge might fulfil the ideal. It was therefore tried as a nasal pack. While one must admit that there was no noticeable, appreciable improvement in nasal respiration, the sponge did allow application of a firm pressure which conformed to the irregularities of the interior of the nose and at the same time allowed for drainage and a certain amount of aeration.

The rubber sponge powder puff, previously described, when cut in half acts as a nasal pack. Both sides of the sponge are lightly covered with petrolatum, which aids in insertion and removal. Nasal insertion is effected with the sponge in the compressed state, the flat side down and the convexity up. Once in the nose, with the compression released, the sponge adapts itself to the irregular nasal cavity, supplies a constant pressure and is self retaining.

When less pressure or less complete coverage of the interior of the nose is needed, it is but a moment's work to cut the sponge to the desired size. One could vary the pressure by securing and using sponges of various densities (a refinement which my associates and I have not found necessary). The serous discharge is expressed by gently squeezing the nostrils as circumstances may require. This materially adds to the patient's comfort and peace of mind, because there is a definite lessening of the feeling of obstruction and even more important (for the patient) there is visible evidence of this relief.

When the sponge is removed, it must be seized by an instrument with a firm grasp, as the compression of the sponge must now be furnished entirely by the external nares, and if a firm grasp is not obtained, the operator will experience some difficulty in overcoming the initial resistance of the sponge against the nares. A mistaken impression of force may be gained, and this is heightened if an instrument which slips off the sponge is used. Inspection of the interior of the nose discloses no evidence of excessive force in the operative area, and the patient experiences no greater discomfort than that inimical to the removal of any nasal packing.

RUBBER SPONGES AFTER NASAL RECONSTRUCTIONS [2]

To those who do nasal reconstructions the postoperative ecchymosis and swelling around the eyes is well known. As well known is the psychic effect of

2. This procedure was first suggested by Dr. William H. Holden, of New York, under whose guidance the search for a suitable sponge material was carried out.

this swelling on certain patients, despite the fact that they have been forewarned. Anything, therefore, which minimizes the swelling and ecchymosis is worth while, from the point of view of both the patient and the operator.

Rubber sponge can be used to advantage. After the application of the nasal splint (either metal or dental compound), two pads of sponge rubber are cut so as to conform to the contour of the orbital hollow. The eyes are closed and the edges of the lids are covered with a thin film of petrolatum. A pad of rubber sponge is then placed over each eye. These pads are lightly fastened with two to three vertically and horizontally placed ½ inch (1.27 cm.) strips of adhesive tape, in a manner giving a slight amount of pressure. No discomfort will be experienced by the patient wearing these pads other than the inconvenience of not being able to use the eyes for the first twenty-four hours after the operation. This should be no hardship, for prior to the use of this technic patients were unable to use their eyes for the same period of time or longer, because of the postoperative reaction.

The pads are removed at the end of twenty-four hours. There may occasionally be a slight amount of swelling and discoloration, but the extensive swelling and ecchymotic reaction which so often accompanied nasal plastics in the past are absent.

PRESSURE DRESSINGS

In operations on the frontal areas and similar operations which necessitate pressure dressings, rubber sponges can be used to supply pressure accurately in the desired area. In the case of frontal pressure dressings, the wound should first be covered with a double layer of gauze, and then a piece of rubber sponge of doughnut shape and of a size to fit the orbital hollow is placed in position. The upper layer or layers (as necessary) are made larger and cover the entire frontal area. In this instance, to be sure of continued pressure, it is necessary to retain the sponge with a bandage rather than with adhesive tape. Such a pressure dressing is much more comfortable than the wet type previously used and at the same time gives a more accurate, evenly continued pressure.

SUMMARY

"Airfoam type" rubber sponge has been suggested for use as nasal packing following submucous resection and for pressure dressing following operations on the frontal areas and nasal plastics.

Progress in Otolaryngology

Summaries of the Bibliographic Material Available in the Field of Otolaryngology

REVIEW OF ALLERGY FOR 1940

W. W. DUKE, M.D.
KANSAS CITY, MO.
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OMAHA

An important development in the field of allergy is the recognition of a large group of cases closely resembling cases of allergy, but with certain fundamental differences. Rackemann,[1] in his article on intrinsic asthma and in his review of the literature on allergy for 1939, began with this significant statement: "All is not allergy that wheezes." By the same token, sneezing and itching of various kinds which seem like allergy may not be due to allergy in the ordinary clinical sense. Many of the patients with these disturbances first come under the care of the rhinologist because of colds; others, because of vasomotor rhinitis. Mortality in the group with the intrinsic conditions is much higher than in the group with extrinsic, or true, allergy. Alexander,[2] in his presidential address of 1939, called attention to the same group. He stated that it is comprised of patients with bronchial asthma, vasomotor rhinitis and chronic urticaria particularly. There is usually no family history suggesting allergy, and skin tests give no information. This group lacks essential criteria to identify their abnormalities with the processes of atopic disorders however much these may be simulated clinically. He concluded that allergists should be prepared to broaden their points of view.

Bivings,[3] in his discussion of asthmatic bronchitis, developed the same idea. He recorded the symptoms of 235 patients in pediatric practice which closely simulated those of patients with allergy but differed in that they were continuous rather than paroxysmal and were constantly associated with local infection. The patients failed to respond to epinephrine and showed no definite sensitivities, and eosinophilia

1. Rackemann, F. M.: Intrinsic Asthma, J. Allergy **11**:147-162, 1940; A Review of the Literature of Allergy, Arch. Int. Med. **65**:185-212 (Jan.) 1940; correction, ibid. **65**:1295 (June) 1940.

2. Alexander, H. L.: Allergic Syndromes in the Absence of Allergens, J. Allergy **11**:163-169, 1940.

3. Bivings, L.: Asthmatic Bronchitis Following Chronic Upper Respiratory Infection, J. A. M. A. **115**:1434-1436 (Oct. 26) 1940.

could not be demonstrated. Hansel [4] referred to this same type when in the consideration of 455 patients, 114, or 25 per cent, did not prove to have respiratory allergy although they were suspected of having it; 44 patients had other manifestations of allergy, and 70 could not be proved to have allergy. Hansel outlined his technic for cytologic examination of the nasal smears. He expressed the belief that this is a definite aid in differentiating the allergic from the nonallergic condition. He warned, however, that a diagnosis cannot always be made on a single specimen, that allergic seizures may be progressive and recessive and that by repeating the examinations the observer may detect the allergic seizures. He further urged that the study of smears be used in conjunction with the history and the physical roentgen and bacteriologic examinations.

Urbach,[5] in reporting on 452 asthmatic ward patients, spoke of the predisposing diseases and conditions as pacemakers of allergy. He stated that in one fourth of the patients bronchitis had been present for many years or from childhood and that hypersensitivity of the bronchial mucosa is certainly not always allergic in nature. He used the term "nonallergic pathergy" or "pathergy" to cover what Rackemann and other writers termed the intrinsic form of asthma.

Schenck [6] stated that it is the responsibility of rhinologists to differentiate between the alterations in the nose and throat due to allergy alone and those due to infection alone or to both. He stated that cytologic studies are helpful but that they are of less value and at times worthless if unaccompanied by clinical rhinologic studies.

Grove and Farrior [7] expressed the opinion that hyperplastic sinusitis is caused solely by bacterial infection, which produces a special pathologic response, conditioned by the allergic constitution, in the allergic patient. Later they reported on 200 additional patients. In this report they still held that chronic hyperplastic sinusitis caused by bacterial infection and not by nasal inhalant allergens represents a special type of bacterial allergy.

Opposing this view, Vaisberg [8] stated that for those who deal with chronic nasal and sinus diseases the maxim should be: "Think of

4. Hansel, F. K.: Allergy of Upper and Lower Respiratory Tracts in Children, Ann. Otol., Rhin. & Laryng. **49**:579-627, 1940.

5. Urbach, E.: Asthma: Analysis of Four Hundred and Fifty-Two Ward Cases, Internat. Clin. **4**:89-107, 1940.

6. Schenck, H. P.: Otolaryngologic Aspects of Allergy, Pennsylvania M. J. **43**:1081-1083, 1940.

7. Grove, R. C., and Farrior, J. B.: Chronic Hyperplastic Sinusitis in Allergic Patients: Bacteriologic Study of Two Hundred Operative Cases, J. Allergy **11**: 271-276, 1940.

8. Vaisberg, M.: Allergic Treatment of Chronic Sinus Conditions: Report of Fifty Cases, New York State J. Med. **40**:631-636, 1940.

allergy first and operation last." Oppegaard [9] also held that every nasal obstruction, whether acute or chronic, should be considered allergic in origin until it is proved not to be. He adds that the history, the physical examination and the laboratory tests are as important as the skin tests. He stated that eosinophilia is indicative of, but not absolute proof of, the presence of allergy. Harris [10] expressed the opinion that definitely allergic sinusitis occurs, that it occurs with and without secondary infection and that disregard of the allergic factor in sinusitis is responsible for the frequency of failure in the surgical treatment of this condition.

While allergists still use and recommend the parenteral injection of extracts in the treatment of hay fever, the method has not won the universal approval of the medical profession. It is expensive and probably too expensive for a large percentage of the population. It requires numerous visits to a physician's office or to a clinic. Because of these disadvantages, any new remedy which appears simple receives popular attention.

POTASSIUM CHLORIDE THERAPY

In 1939 Bloom [11] recommended the use of potassium chloride and some other potassium salts in the treatment of all allergic conditions except chronic asthma. During the past year several authors have reported on their experiences with this form of therapy. Furstenberg and Gay [12] stated that potassium chloride administered in doses of 15 to 80 grains (0.97 to 5.17 Gm.) a day to 85 patients had no appreciable therapeutic effect. Harsh and Donovan,[13] in a clinical study of 40 patients with miscellaneous forms of allergy, chiefly hay fever, who were treated with potassium chloride, reported negative or questionable results in all but 1. Engelsher [14] stated that in the use of new remedies caution must be the watchword and that potassium chloride is of limited value in cases of hay fever and other allergies and produces many side reactions, some of them extremely uncomfortable. Spain

9. Oppegaard, C. L.: Nasal Obstruction: Is It Allergic? Minnesota Med. **23**:112-115, 1940.

10. Harris, M. C.: Allergic Sinusitis, New York State J. Med. **40**:1020-1023, 1940.

11. Bloom, B., and Grauman, S. S.: Potassium in Allergy, Southwestern Med. **23**:205-208, 1939.

12. Furstenberg, F. F., and Gay, L. N.: Observations on the Ineffectiveness of Oral Administration of Potassium Chloride in Various Forms of Allergy, Bull. Johns Hopkins Hosp. **67**:219-224, 1940.

13. Harsh, G. F., and Donovan, P. B.: Potassium Chloride in Allergic Disorders: Clinical Study, J. A. M. A. **114**:1859-1863 (May 11) 1940.

14. Engelsher, D. L.: Potassium Chloride in Hay Fever and Other Allergies: Personal Study of Ninety-Seven Cases, Ohio State M. J. **36**:949, 1940.

and co-workers [15] reported that potassium chloride in their hands had been altogether disappointing in the treatment of hay fever and allergic coryza.

On the other side are Smith and Steffenson,[16] who report on a series of 117 patients treated with potassium chloride for allergic rhinitis and the allied allergic disorders. They stated that the drug seems to offer many such sufferers complete relief and many others improvement. Parker [17] stated that persons with asthma, hay fever and vasomotor rhinitis were generally benefited or completely relieved by the daily oral administration of potassium chloride or potassium gluconate. He stated that persons with eczema were little benefited. It was his belief that the gluconate was as effective as the chloride and less irritating. Kern [18] adopted a middle of the road attitude toward potassium chloride, saying that by no means all patients, not even a sizable minority, were helped by potassium chloride alone. He stated that there may be some place for the drug and implied that further study is necessary.

HISTAMINASE

Histaminase is another preparation which has received public attention. Miller and Piness [19] reported the use of histaminase in the treatment of 42 allergic patients. They stated that they had failed to obtain unequivocable evidence that the drug was responsible for the relief or prevention of any of the signs or symptoms of which the patients complained. Keeney [20] administered histaminase orally to 15 patients with typical ragweed hay fever during the height of the 1939 ragweed season. Histaminase failed to give relief to any of the patients so treated. Prickman and co-workers [21] directed attention to the fact that there may be some variations in the potency of the histaminase on the market and said that conclusions could not be drawn at this time. They observed 29 patients who had vasomotor rhinitis. Of these, 12 appar-

15. Spain, W. C.; Westcott, F. H., and Gaillard, G. E.: The Use of Potassium Chloride in the Treatment of Allergic Conditions, J. Allergy **11**:388-392, 1940.

16. Smith, F., and Steffenson, W. H.: Potassium Chloride in Allergy: Report of One Hundred and Seventeen Cases, J. Michigan M. Soc. **39**:485-486, 1940.

17. Parker, F. P.: Blood Potassium Studies in Allergic States: Relation to Potassium Therapy, South. M. J. **33**:1301-1309, 1940.

18. Kern, R. A.: Role of Water Balance in the Clinical Manifestations of Allergy, Am. J. M. Sc. **199**:778-789, 1940.

19. Miller, H., and Piness, G.: Histaminase in Treatment of Allergy, J. A. M. A. **114**:1742-1744 (May 4) 1940.

20. Keeney, E. L.: Histaminase in the Treatment of Hay Fever, J. A. M. A. **114**:2448-2449 (June 22) 1940.

21. Prickman, L. E.; Lillie, H. I.; Rothe, G. M., and Fleming, R. G.: Results of Use of Extract of Intestinal Mucosa (Histaminase) in Treatment of Vasomotor Rhinitis, Ann. Int. Med. **13**:2235-2240, 1940.

ently obtained relief. In their work 2 tablets of histaminase were administered before each meal.

Forman [22] reported the use of histaminase in 29 cases. He expressed the opinion that the drug offered a new helpful approach to the relief of urticaria, angioneurotic edema, atopic dermatitis and acute allergic coryza. He stated, however, that the work would have to be extended before final conclusions could be reached; the outlook seemed hopeful. Roth and Horton [23] observed 150 patients and stated, on the basis of this preliminary work, that histaminase offered effective therapeutic results in certain cases of clinical hypersensitiveness. The Council [24] on Pharmacy and Chemistry of the American Medical Association published a good review of the results obtained with histaminase but conclude that, owing to the conflicting reports on its efficiency, the time has not arrived for its inclusion in "New and Nonofficial Remedies."

ORAL ADMINISTRATION OF POLLENS AND POLLEN EXTRACTS

Before leaving the field of therapy, we should mention the status of the oral administration of pollens. Preparations of pollens are available and in years past their use has received quite a bit of attention. Feinberg and co-workers [25] stated in their appraisal of this therapy that investigators diverge from complete rejection to limited acceptance. They concurred in the opinion that oral ingestion of pollen in the doses used in their investigations (the total ingestion being from 0.2 to 10,000,000 noon or pollen units) is a safe procedure, that it is accompanied by frequent troublesome, sometimes severe gastrointestinal reactions and that its effectiveness is of a minor grade. Alperstein [26] held that the oral administration of pollen was not to be recommended as it had no particular advantage over the parenteral.

Schwartz [27] reported on the use of pollen extracts. Sixty-five patients were treated by the oral method. Most of these were sensitized to Bermuda grass, careless weed and Russian thistle. Twenty-six had complete relief from symptoms, and 31 had satisfactory relief. In the remaining 8 patients the results were not satisfactory. The author

22. Forman, J.: Use of Histaminase in the Treatment of Various Allergic Manifestations, Ohio State M. J. **36**:56-58, 1940.

23. Roth, G. M., and Horton, B. T.: Histaminase: Physiologic Effects on Man and Its Therapeutic Value in Medicine, Bull. New York Acad. Med. **16**:570-584, 1940.

24. Preliminary Report on Histaminase: Torantil, preliminary report of the Council on Pharmacy and Chemistry, J. A. M. A. **115**:1019-1021 (Sept. 21) 1940.

25. Feinberg, S. M., and others: Oral Pollen Therapy in Ragweed Pollinosis: Cooperative Study, J. A. M. A. **115**:23-29 (July 6) 1940.

26. Alperstein, B. B.: Oral Versus Parenteral Pollen Therapy: Clinical Study, J. Allergy **11**:498-508, 1940.

27. Schwartz, S. C.: Oral Pollen Therapy, J. Lab. & Clin. Med. **25**:566-575, 1940.

expressed the belief that the oral administration of pollen extract cannot entirely supplant the parenteral in desensitization. A considerable number of patients, however, can be given as much relief by intelligent oral as by hypodermic therapy. Sheppe [28] apparently confirmed the work of Schwartz. Seventy-six patients were treated by him with results extremely satisfactory to both him and the patients. From the results obtained by these two authors it seems that investigation of the oral method of treatment by means of pollen extracts might be carried further.

ZINC IONIZATION AND OTHER FORMS OF TREATMENT

Zinc ionization has been discussed in the literature extensively during the past few years. Some men still recommend its use. Birrell [29] gave a history of this procedure and reported its use in 120 cases of nasal allergy. He stated that he had obtained cures in 31 per cent and great improvement in 43 per cent of these cases. In cases of hay fever his results were cures in 32 per cent and improvement in 52 per cent. In cases of vasomotor rhinitis the results were not so satisfactory. His results in cases of asthma coincided with his results in cases of hay fever. Cohen,[30] instead of zinc ionization, has used chromic acid solution for the relief of allergic rhinitis. He emphasized that the specific cause must be avoided whenever possible but that relief of symptoms can be obtained by the careful use of a 30 per cent solution of chromic acid.

Other writers have recommended various treatments for the allergic condition. Brown [31] recommended ½ grain (0.032 Gm.) of ephedrine sulfate, ½ grain of soluble phenobarbital U. S. P. and 3 grains (0.19 Gm.) of theophylline with sodium acetate U. S. P. for the relief of asthma, especially that which occurs at night. Sokal [32] reported on 6 patients treated for asthma with pertussis vaccine. The series is entirely too small to permit conclusions as to this form of treatment; many more patients will have to be treated. The mention of this treatment in newspaper columns has aroused public interest.

Hansen-Pruss [33] stated that any one who deals with allergic persons realizes sooner or later that the emotional makeup should be considered.

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28. Sheppe, W. M.: The Treatment of Hay Fever by the Oral Route, Proc. Staff Conf., Wheeling Clinic **11**:73, 1940.

29. Birrell, J. F.: Role of Zinc Ionization in Treatment of Allergy in the Nose, Edinburgh M. J. **47**:645-652, 1940.

30. Cohen, S.: Allergic Rhinitis: Rhinologic Treatment, M. Rec. **152**:178-181, 1940.

31. Brown, E. A.: A New Type of Medication to Be Used in Bronchial Asthma and Other Allergic Conditions: Preliminary Note, New England J. Med. **223**: 843-846, 1940.

32. Sokal, H. B.: Treatment of Severe Bronchial Asthma with Pertussis Vaccine: Preliminary Report, M. Rec. **152**:368-370, 1940.

33. Hansen-Pruss, O. C.: The Importance of Psychogenic Factors in the Treatment of Allergic Disturbances, South. M. J. **33**:1317-1323, 1940.

It has been his observation that the families of asthmatic patients show perhaps a slightly higher incidence of psychic imbalance than the population as a whole but that it is perhaps very little higher than that expected in patients in general. He urged that in the treatment of allergic persons, particularly those who are asthmatic, the emotional life be considered.

Shackelford and Koontz [34] investigated the effect of ether anesthesia on anaphylaxis. They concluded that in the guinea pig ether anesthesia probably offers strong but not absolute protection against anaphylactic shock. They stated that while the same may be true in man, more work must be done to justify the elimination of the test for sensitivity prior to the administration of serum to a patient under anesthesia.

ETIOLOGIC FACTORS

As to additional causes of hay fever or allergy of the upper respiratory tract, Waldbott and Ascher [35] expressed the opinion that sensitivity to rust and smut is an important cause of seasonal allergy. Pennington,[36] in testing for infection with molds in a series of 526 patients, found that 32.5 per cent gave 2 plus reactions to one or more mold extracts. She suggested that these materials must take their place among the foods, pollens and other inhalants employed in tests for allergy. Phillips [37] reported on sensitivity to Johnson grass smut. As this is a fairly new comer to Arizona, he had occasion to study the spread of this smut. He concluded that in his series of patients five seasons of exposure were necessary before the patient acquired cutaneous and clinical sensitivity to the fungus.

ALLERGY IN CHILDHOOD

Hill,[38] in discussing allergy in children stated that the allergic child should be under observation not for weeks or months but for years. Although the child may overcome some of his sensitivities, he may acquire new ones. Such a patient has a constitutional defect just as a diabetic child has—a defect which cannot be changed by any doctor. Brem and Colmes [39] pointed out that manifestations of allergy occur

34. Shackelford, R. T., and Koontz, A. R.: The Effects of Ether Anesthesia on Anaphylaxis, Anesth. & Analg. **19**:196-201, 1940.

35. Waldbott, G. L., and Ascher, M. S.: Rust and Smut, Major Causes of Respiratory Allergy, Ann. Int. Med. **14**:215-224, 1940.

36. Pennington, E. S.: Study of the Incidence of Air-Borne Molds and of Skin Sensitivity to Molds, South. M. J. **33**:931-939, 1940.

37. Phillips, E. W.: Time Required for the Production of Hay Fever by Spores of a Newly Encountered Fungus, Johnson Grass Smut, J. Allergy **12**:24-27, 1940.

38. Hill, L. W.: Allergy in Childhood, Bull. New York Acad. Med. **16**:395-403, 1940.

39. Brem, J. C., and Colmes, A.: Clinical and Potential Allergy in Families with Allergic Children, New England J. Med. **223**:329-331, 1940.

much more frequently in children whose parents have a history of allergy. Piness and Miller [40] decried the incautious resort to tonsillectomy in the allergic child. They stated that of 685 allergic children from whom information was available 17 per cent had their first allergic symptoms after tonsillectomy. Rudolph [41] urged that the child with frequent colds and the child who gets over one cold only to have another in a few weeks should be studied carefully from the allergic standpoint and that the ultimate aim in the treatment of this child should be the prevention of asthma and other forms of major allergy. This author quoted Todd's [42] description of the malformations of the jaws and teeth from nasal allergy.

Cohen [43] stated that disturbances in growth during the development of the bones of the face give the allergic child a typical facies. As the face develops in three dimensions, one must look for disturbances of facial growth in its anterior, lateral and vertical dimensions. The allergic child may show thoracic changes secondary to long-standing asthma. The roentgen examination is a valuable adjunct in the study of the allergic child in that such a child may show scorings in the metaphyses of growing bones, which are small transverse lines of increased density. Normal mineralization is sometimes inhibited by allergy, more frequently by intestinal allergy. Francis [44] stated that epiphysial ossification is a more delicate objective indicator of constitutional health than is progress in height and weight and that gastrointestinal sensitivity in infancy, even when controlled to the point that there is no retardation in growth and length, nevertheless tends to retard epiphysial ossification.

Shaw and Thelander [45] raised the question whether a deficiency of vitamin C in early infancy may be the cause of the conditions out of which allergies develop later and stated that they are giving ascorbic acid after the first few days of life and are studying their group to see whether allergies are reduced. Faber and O'Byrne [46] directed attention

40. Piness, G., and Miller, H.: Allergy of the Upper Respiratory Tract in Infancy and Childhood, J. A. M. A. **113**:734-737 (Aug. 26) 1939.

41. Rudolph, J. A.: Allergy as a Cause of Frequently Recurring Colds and Coughs in Children, Dis. Chest **6**:138-141, 1940.

42. Todd, T. W.: Facial Growth as an Objective Record of Child Health, Angle Orthodontist **9**:20-29, 1939.

43. Cohen, M. B., and Cohen, S.: Examination of the Allergic Child, Arch. Pediat. **57**:241-256, 1940; Newer Concepts of Allergy, Kentucky M. J. **38**:188-190, 1940.

44. Francis, C. C.: Factors Influencing Appearance of Centers of Ossification During Early Childhood, Am. J. Dis. Child. **59**:1006-1012 (May) 1940.

45. Shaw, E. B., and Thelander, H. E.: Importance of the Sensitization Mechanism in the Clinical Phenomenon of Allergy, Am. J. Dis. Child. **58**:581-585 (Sept.) 1939.

46. Faber, E. G., and O'Byrne, G. T.: Management of Allergic Diseases of Childhood, Tri-State M. J. **12**:2450-2454, 1940.

to the fact that the dietary treatment of a child for allergy must not interfere with the child's growth and development, that a child had better have urticaria than malnutrition, that when vital foods are eliminated from the diet, substitutions must be made, and that nasal drops of oily preparations are contraindicated. Tumpeer [47] stressed the fact that the allergic child must be studied not only from the standpoint of allergy but from that of the disturbance of the orderly process of growth which such a chronic constitutional disorder must produce. Pratt [48] described the pathologic appearance of the lungs of children having bronchial asthma. He expressed the belief that the infection found is largely a sequel of allergy.

Copeland and Keating [49] urged that the term "outgrow" should not be used in talking to the parents of allergic youngsters. They stated that the child has an inherited tendency to become sensitive to allergic substances which may change as he gets older and that successful treatment of hay fever in childhood helps to eliminate the frequent winter colds which usually are observed in the allergic child.

Thomas and Johnston [50] discussed headaches of allergic and nonallergic origin from the standpoints of etiology and symptomatology. In all 6 of the cases which they record in their article there was a previous history of allergy in the patient or in the family.

The audiometric range in allergy was studied by Greenwood.[51] He stated that as compared with normal persons allergic patients show a marked deficit in hearing for the lower tones but that until more work is done the findings must of necessity be accepted with reservations.

In closing, we should like to call to the attention of physicians the Badianus Manuscript,[52] one of the outstanding medical publications of 1940. This is a reproduction of an Aztec herbal, probably the first medical text written on the American continent. It is reproduced in its original colors. On plate 24 there is a description of vasomotor rhinitis and its treatment. So we know that this allergic manifestation has been on the North American continent for four hundred years.

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47. Tumpeer, I. H.: The Upper Respiratory Revenge of the Allergic Child, Illinois M. J. **77**:37-44, 1940.

48. Pratt, H. N.: The Pathologic Physiology of Bronchial Asthma in Children, with Reference to the Role of Infection, New England J. Med. **223**:626-629, 1940.

49. Copeland, S. C., and Keating, J. P.: Pollen Asthma and Hay Fever in Children, Pennsylvania M. J. **43**:1137-1140, 1940.

50. Thomas, J. W., and Johnston, C. R. K.: Headaches of Allergic Origin, M. Clin. North America **24**:285-299, 1940.

51. Greenwood, G. J.: Audiometric Range in Allergy, Laryngoscope **50**:326-330, 1940.

52. Emmart, E. W.: Badianus Manuscript, (Codex Barberini, Latin 241) Vatican Library: An Aztec Herbal of 1552, Introduction, Translation and Annotations by E. W. Emmart, Baltimore, Johns Hopkins Press, 1940.

News and Comment

CASSELBERRY AWARD

The American Laryngological Association now has available a sufficient sum of money to be granted as a prize for a thesis dealing with original investigation and research in laryngology or rhinology. Theses or reports of work must be in the hands of the secretary before March 1, 1942.

Further details may be procured from Dr. C. J. Imperatori, secretary, 108 East Thirty-Eighth Street, New York.

Abstracts from Current Literature

Ear

ACUTE OTITIS MEDIA AND MASTOIDITIS IN CHILDREN. HORACE JAMES WILLIAMS, Pennsylvania M. J. **44**:590 (Feb.) 1941.

The author reports that surgical mastoiditis has decreased in frequency. In a series of patients at the Philadelphia Hospital for Contagious Diseases 61.7 per cent of those in whom otitis media developed were under 5 years of age and 30.2 per cent were between the fifth and the tenth year. In the entire series 6.8 per cent had had their tonsils and adenoids removed, and of those in whom otitis media developed only 3.5 per cent had had their tonsils and adenoids removed. Anatomic factors of the greater frequency of otitis media occurring in children under 2 years of age are brought to attention.

The advantages of upright and prone changes of position in reducing the collection of secretions in the nasopharynx are stated, as is the importance of not blowing the nose. The author advises the use of sulfanilamide early in otitis media. He also advises against the indefinite continuance of its administration and reminds the readers of the importance of observation in the hospital and of the pitfalls of masked symptoms under sulfanilamide therapy. He points out the importance of quietness in a patient under ethyl chloride or nitrous oxide anesthesia in order that myringotomy may be performed under the best conditions that favor proper incision, good drainage and prompt healing.

WEINBERGER, Sayre, Pa.

PREVENTION OF MASTOIDITIS. V. G. HORAN and S. GAY FRENCH, Lancet **1**:680 (April 13) 1940.

A series of 621 cases in which acute suppurative otitis media was treated with sulfanilamide is reported. The incidence of mastoiditis was only 3.4 per cent, as compared with 22.7 per cent before the introduction of this drug. No serious toxic manifestations were seen.

LANGMANN, New York. [AM. J. DIS. CHILD.]

DISCUSSION ON EAR DISEASE IN THE CHILD. A. G. WELLS and PHYLLIS KERRIDGE, Proc. Roy. Soc. Med. **32**:1625 (Oct.) 1939.

Taking up the treatment of aural disease in children, Wells (1) discusses fully diastolization (*a*) by itself, (*b*) with nasal application, (*c*) plus local treatment for otorrhea and (*d*) plus removal of tonsils and adenoids; (2) refers briefly to the treatment of chlorine ionization; (3) states that for catarrhal condition of the nose, ear and throat local treatment should be combined with general treatment, particularly an increase in raw foods, fruit and vegetables and a corresponding limitation of carbohydrates; (4) says that in cases of chronic suppurative otitis media he employs various treatments, outstanding among which is zinc ionization, and (5) reports that in treating acute inflammation of the middle ear he sends most patients to bed with instructions to rest in the semirecumbent position with a flannel garment covering the head and face completely, keeping it on for forty-eight hours so that the continuous heat which it causes results in hyperemia and as large a supply as possible of white cells to combat the infection; in some cases, in addition, phenol and glycerin drops are used.

Kerridge states that the Board of Education of England estimated that eighty per thousand school children have defective hearing, but 95 per cent of such children have defects so slight that the term deafness is not suitable and the children do not suffer from any educational handicap. Most of them (98 per cent)

need medical care over a long period for their general health. The defects of hearing in these children are due to chronic disease of the middle ear, resulting from scarlet fever or measles. Defective hearing among the elementary school children is four times as common as among children in private schools. Climate does not appear to have as much effect on the condition as was expected.

WILLIAMSON, New Orleans. [AM. J. DIS. CHILD.]

DISCUSSION ON THE TRANSMEATAL APPROACH TO THE MASTOID. Proc. Roy. Soc. Med. **33**:195 (Feb.) 1940.

Dr. G. B. Brand reviewed the technic of the endaural surgical approach to the temporal bone as described by Lempert in May 1938, mentioning the advantages claimed for this method of approach. He stated that since October 1938 in the otologic department of the Victoria Infirmary of Glasgow, Scotland, he and his associates had used Lempert's technic in 2 cases in which the condition was acute and in 23 in which radical operation was required. In the 2 cases in which the condition was acute the results were not very satisfactory, but he thought there was a great advantage in the radical mastoidectomy when done by the transmeatal route.

Mr. Walter Howarth stressed the point that the transmeatal route was not new, having been used by Kessel and his pupil, Hoffman. Others also had used it but had abandoned it for the postauricular approach. He thought the transmeatal route was not suitable for extensive infection in acute mastoiditis but was useful in the modified radical operation.

G. H. Bateman had done 32 simple and 21 radical or modified radical mastoidectomies by this method, and he was of the opinion that the end results were as good as the results he had obtained with the postauricular incision. He overcame the tendency for narrowing of the meatus in the healing process by packing the cavity with gauze for the first two weeks.

Mr. John Gerrie had found no difficulty in removing remote cells or exposing the dura or lateral sinus in doing mastoidectomies by the transmeatal route. He thought it was a particularly good method in children.

Dr. T. R. Rodger appeared to doubt that the method would adequately deal with extensive removal of the dural or sinus plate.

In further discussion various others mentioned certain points favorable and certain points not favorable to operating by the transmeatal route. Some thought it allowed easier postoperative care, while others thought the opposite.

CAMPBELL, Philadelphia.

THE MECHANISM OF ACUSTICO-LATERAL SENSE ORGANS IN FISHES, WITH SPECIAL REFERENCE TO PROBLEMS IN THE PHYSIOLOGY OF SEMICIRCULAR CANALS. A. SAND, Proc. Roy. Soc. Med. **33**:741 (Oct.) 1940.

Sand gives the following summary of the information gained from an analysis of the activity of the lateral line canals and semicircular canals in fishes:

"(1) The activity of the horizontal canals is confined to planes near the horizontal. The vertical canals are active in all planes, and work together in antagonistic pairs, but the pairs are different and specific for each of the three primary axes of rotation.

"(2) The tonic action of the semicircular canals is due to the spontaneous activity of hair-cells, which discharge a persistent rhythm of afferent impulses in the absence of external stimulation.

"(3) The two-way response of an individual semicircular canal, whose discharge is increased by rotation in one direction and inhibited by rotation in the opposite direction, provides a basis for the interpretation of the persistence of reflex responses to opposite sense of rotation in animals after unilateral extirpation of the labyrinth.

"(4) Excitation of the crista of the horizontal ampulla is evoked by ipsilateral acceleration and contralateral deceleration (and inhibition by contralateral acceleration and ipsilateral deceleration), but, owing to the physical properties of the cupula, the effects persist for about half a minute after acceleration or deceleration has given place to constant angular velocity or the stationary state, and thus a peripheral mechanism is provided which is adequate to account for the origin and duration of nystagmus and after-nystagmus." CAMPBELL, Philadelphia.

THE RINNE TEST AND PNEUMOCOCCUS MUCOSUS OTITIS. O. KAARMA, Monatschr. f. Ohrenh. **74**:339 (July) 1940.

In acute conditions of the middle ear and in mastoiditis the reaction to a Rinne test is more or less distinctly positive instead of negative in about 25 per cent of cases. This has been found to prevail especially in otitis of Pneumococcus mucosus origin.

LEDERER, Chicago.

THE POSSIBILITIES OF VITAMIN C THERAPY IN INNER EAR DEAFNESS AND TINNITUS. M. BAER, Monatschr. f. Ohrenh. **74**:342 (July) 1940.

In criticizing Szolnoky, the author agrees that ascorbic acid often makes tinnitus disappear, even more so in combination with vitamin B_1. He warns not to draw too definite conclusions from Szolnoky's cases, as the original diagnosis of arteriosclerosis was not clearly enough defined.

LEDERER, Chicago.

Pharynx

CONTRIBUTION TO THE BACTERIOLOGY OF THE TONSIL ESPECIALLY IN SCARLET FEVER. KOBYZYSKA, CHUDEJOVEJ and HOFFMANN, Bratisl. lékar. listy **17**:272 (June) 1937.

The authors were struck by the similarity of cultures of material from the throat of siblings and of children in close contact. A review of the literature is followed by a detailed report on the cultural observations in cases of rheumatism, chorea with and without tonsillitis, scarlet fever, acute and chronic tonsillitis and polyarthritis The signs and symptoms were no criterion as to the presence of hemolytic streptococci, and the cultural sequence sometimes changed at intervals of several days. In determining the period of isolation for a patient with scarlet fever, both desquamation and cultural observations must be considered. Among 69 patients with scarlet fever, the bacteriologic findings of 6 became normal in three weeks, of 5 in four weeks, of 11 in five weeks, of 34 in six weeks and of 13 in seven weeks. In a considerable percentage of cases the period of desquamation and that of positive cultures were synchronous. Convalescent patients and those with the disease in the early stage should be separated to avoid reinfection. Reinfection with other organisms, such as Staphylococcus, is an important factor, because of lowered tissue resistance resulting from the primary streptococcic infection.

STULIK, Chicago. [AM. J. DIS. CHILD.]

FATAL HEART DISEASE AFTER TONSILLITIS. P. KISS, Orvosi hetil. **84**:177 (April 6) 1940.

A 13 year old boy had tonsillitis follicularis, which lasted for four days. After six days he was sent to school. On the fourth day thereafter the child became suddenly ill, with vomiting and heart block, and acute myocarditis developed, which ended fatally in four days. The pathologic examination showed evidence of acute myocarditis. Diphtheria bacilli could not be found. From the blood of the heart hemolytic streptococci were cultured. Kiss proposes that children should rest for at least a week after tonsillitis.

GÖTTCHE, Budapest, Hungary. [AM. J. DIS. CHILD.]

ACUTE ENDOCARDITIS AFTER TONSILLECTOMY. ARVID WALLGREN, Svenska läk.-tidning. **36**:1017 (May 19) 1939.

A boy of 9 years who was hospitalized for primary tuberculosis suffered from repeated attacks of tonsillitis, which eventually had to be stopped by tonsillectomy. Immediately after this operation, high fever, a great increase in the sedimentation rate and arthralgia occurred. A blood culture was sterile. Examinations of the blood showed decreasing hemoglobin values. No pathologic changes in the internal organs were observed. The condition remained unchanged for three weeks and was supposed to be due to septicemia. A blood transfusion was given. The temperature dropped and the sedimentation rate improved, and after another two weeks both were normal. At this point a murmur suggestive of endocarditis was noted and an electrocardiogram showed myocardial changes. The endocarditis healed, leaving some chronic valvular disease. Some weeks later the boy contracted chorea. The endocarditis is supposed to have been due to a specific rheumatic infection which flared up with the tonsillectomy.

WALLGREN, Göteborg, Sweden. [AM. J. DIS. CHILD.]

Larynx

LARYNGEAL OBSTRUCTION IN CHILDHOOD. F. ARDEN, M. J. Australia **2**:331 (Oct. 12) 1940.

Arden describes the following conditions which cause laryngeal obstruction in children: (1) congenital laryngeal stridor, which is due to the presence of an unusually flexible epiglottis, the lateral margins of which are rolled backward so that they almost meet posteriorly (the aryepiglottic folds are thus brought close together, which gives the entrance to the larynx the appearance of being pinched from side to side; the condition disappears spontaneously during the second year as the larynx enlarges and its walls stiffen); (2) laryngismus stridulus (never seen in Brisbane); (3) foreign bodies in the larynx; (4) papilloma of the larynx (rare and tends to retrogress at puberty); (5) stenosis of the larynx; (6) acute catarrhal laryngitis; (7) laryngitis stridulosa (children with this condition [croup] in early life not infrequently have asthma later); (8) syphilitic laryngitis; (9) edema of the glottis; (10) retropharyngeal abscess; (11) acute laryngotracheobronchitis, and (12) laryngeal diphtheria, which is still the commonest cause.

When an artificial airway must be provided, tracheotomy is preferable to intubation.

GONCE, Madison, Wis. [Am. J. DIS. CHILD.]

CASE OF CONGENITAL LARYNGEAL STRIDOR. S. SIWE, Nord. med. **2**:1225 (April 22) 1939.

A child 1½ years of age had suffered from distinct laryngeal stridor since birth. It varied in intensity. There were abnormal mobility and laxity of the epiglottic cartilage; at every inspiration the epiglottis displaced itself horizontally over the laryngeal introitus. The possibility of dysplasia of the epiglottic cartilage is discussed.

WALLGREN, Göteborg, Sweden. [AM. J. DIS. CHILD.]

ASTHMATIFORM ATTACKS, WITH SUFFOCATION, IN A CHILD. K. H. KÖSTER, Nord. med. (Hospitalstid.) **2**:1251 (April 29) 1939.

A girl of 3½ years fell suddenly ill with stridor and increasing cyanosis and eventually became unconscious. Tracheotomy was performed and artificial respiration induced. During this procedure a large amount of somewhat sanguinolent edema fluid was passed through the wound, after which she began to breathe freely and the cyanosis disappeared. Some days later a second attack occurred; there were stridor, cyanosis, apnea and loss of consciousness. The lower part of the respiratory tract was cleansed by means of a Nélaton catheter, and artificial respiration was induced, after which the girl again recovered. The tracheotomy

cannula was removed after two weeks and the patient discharged in good health. The diagnosis is discussed with regard to tetany, tonsillopulmonary toxemia (Heerup) and asthma; the author is inclined to favor the last possibility.

WALLGREN, Göteborg, Sweden. [AM. J. DIS. CHILD.]

Nose

INTRANASAL TREATMENT IN LEPROSY. E. MUIR, Leprosy Rev. **11**:173 (Oct.) 1940.

One of the most distressing complications of leprosy, especially of the lepromatous type, is involvement of the nasal cavities and their sinuses. Primary involvement is usually followed by secondary infection. Treatment of this condition consists of: (*a*) the prevention of sepsis by a technic described in detail but consisting essentially of a method of displacement irrigations; (*b*) treatment of the actual sepsis by a modification of the aforementioned technic employing different solutions and a more thorough technic of irrigation and subsequent washings, and (*c*) cauterization of the actual lesions with trichloroacetic acid with cocaine anesthesia.

The importance of early treatment of nasal lesions is twofold: (*a*) prevention of deformities and (*b*) lessening of the danger of discharge of the bacilli from the nose and consequent spread of the infection.

FRUMESS, Denver. [ARCH. DERMAT. & SYPH.]

ANATOMIC ALTERATIONS OF THE NASAL MUCOSA IN VASOMOTOR CORYZA. C. A. TORRIGIANI, A. LUNEDEI and U. TEODORI, Riv. di clin. med. (supp. Margin. otolaryng.) **1**:134, 1940.

The alterations of the nasal mucosa noted in vasomotor coryza are:

1. The epithelium in some cases is hyperplastic, with hyperproduction of the muciparous cells; in others there is a tendency toward metaplasia of the pavement layer and in still others toward atrophy.

2. The basilar membrane, which in normal subjects stains with a silver preparation, according to del Río Hortega, in this condition loses the silver stain and becomes homogeneous and much inspissated, and tends toward a hyaline change.

3. In some cases the connective tissue demonstrates edema and is rich in polynucleated eosinophils; in others it is poor in cellular elements and shows collagenous transformation with much hyalin.

4. The glands in some instances show a reduction in number and are atrophic, while in others functional activity is conserved. In still others the glands are filled with secretion and show cystic dilatation.

5. The vessels show little change, with an increase of sclerosis in the adventitia and hyaline changes in the connective stroma.

A. A. S. GIORDANO, Philadelphia.

INFECTIONS OF THE PARANASAL SINUSES AND THEIR TREATMENT. HUMBERTO BISI, Rev. med. y cien. afines **2**:822 (Nov. 30) 1940.

After discussing the anatomic relations of the paranasal sinuses, Bisi stresses the diseases and the various routes of infection of these sinuses. He outlines the symptoms, diagnosis and medical and surgical treatment.

In a pansinusitis he prefers to employ the technic of Ermiro, of Lima, Peru. The surgeon performs a Caldwell-Luc operation and then, through the maxillary opening, exenterates both the anterior and the posterior ethmoid cells, opening the sphenoid sinuses and coming forward and entering the frontal sinuses. The middle turbinate is left in situ. It not only acts as a landmark but later prevents extensive crusting and atrophy within the nares.

In closing, Bisi cites the successful results obtained by this method of treatment in many cases.

PERSKY, Philadelphia.

Miscellaneous

THE EFFECT OF CITRUS FRUIT JUICES AND OF VARIOUS MOUTH PROPHYLAXES ON THE ORAL FLORA. H. J. FLORESTANO, J. E. FABER, and L. H. JAMES, J. Bact. **39**:24 (Jan.) 1940.

This is a most interesting presentation. Quantitative determinations of the micro-organisms found in the saliva of 9 normal persons were made by the authors before and after each patient had used the following materials: water, orange juice, grapefruit juice, hexylresorcinol tooth paste and mouth wash, sodium ricinoleate tooth paste and mouth wash and a liquid dentifrice. "Plain agar was used for enumerating saprophytic types, tomato juice agar for aciduric organisms, and blood agar for potential pathogens. Samples of saliva were examined before lunch, after lunch, after prophylaxis and 2 hours later."

Using the "after lunch" counts as a 100 per cent basis for determining the average percentage decrease in bacterial counts immediately after prophylaxis, the investigators found that the counts for sodium ricinoleate tooth paste and mouth wash and for liquid dentifrice were, respectively, 89 per cent and 86 per cent less than the counts obtained after lunch. With hexylresorcinol tooth paste and mouth wash, the decrease was 59 per cent; with grapefruit juice, 56 per cent, and with orange juice, 47 per cent.

Although sodium ricinoleate tooth paste and mouth wash and liquid dentifrice were most effective in the actual removal of organisms, they were least effective in inhibiting further microbial action. "When the counts immediately after prophylaxis were used as a 100 per cent basis for determining the average percentage increase 2 hours later, the citrus juices were found to be the most effective in checking microbial activity." STOESSER, Minneapolis. [AM. J. DIS. CHILD.]

INTRINSIC ASTHMA. FRANCIS S. RACKEMANN, J. Allergy **11**:147 (Jan.) 1940.

This is a thought-provoking article describing a group of 283 patients whose asthma bore no relation to changes in season, environment or diet.

The mortality rate in this "intrinsic" group was 8 per cent, whereas in a group of 2,000 cases in which an extrinsic factor was the cause of the condition, the mortality rate was nil except for an occasional death that could be attributed to some accident, such as too large a dose of desensitizing substance administered to a very sensitive patient.

The "intrinsic" group is made up chiefly of adults, especially those in middle age.

"The theories concerning the nature of intrinsic asthma are discussed with the suggestion that allergy is only one of the exciting causes of a group of symptoms which together make a syndrome characterized by asthma, by lesions of the nasal and sinus membranes, and by eosinophilia, as well as by the less definite "allergic toxemia." Behind the syndrome must be some fundamental disturbance—an "x" factor—so far entirely unknown, but which may occur in excess rather than in deficiency. Even if it can be proved to be a histamine-like substance, the reason for its abnormal occurrence remains to be determined."

HOYER, Cincinnati. [AM. J. DIS. CHILD.]

POSSIBLE RELATION BETWEEN TONSILLECTOMY AND THE INCIDENCE OF ACUTE ANTERIOR POLIOMYELITIS. PIER REMAGGI, Pediatria **48**:184 (March) 1940.

The author examined 582 patients with poliomyelitis, of whom only 3 had undergone tonsillectomy a few months previously. On the other hand, of 224 patients operated on for removal of tonsils and adenoids during the recent epidemic of poliomyelitis, only 1 contracted poliomyelitis, several months after the operation. The author concludes that recent removal of the tonsils and adenoids does not favor an increased incidence of poliomyelitis.

MARTOCCIO, Utica, N. Y. [AM. J. DIS. CHILD.]

ROENTGENOLOGIC AND DIFFERENTIAL DIAGNOSIS OF HYPEROSTOSIS FRONTALIS INTERNA. O. SOTO, Rev. de neuro-psiquiat. **2**:325 (Sept.) 1939.

The roentgenographic picture of Stewart-Morel disease is characterized by thickening of the calvarium in the vertical portion of the frontal bone which does not reach the orbital plate but may extend backward as far as the parietal region. Hyperostoses involve the inner table of the skull. The inner table loses its parallelism with the outer and encroaches more or less on the intracranial cavity. The degree of thickening may vary considerably. The density of the thickened bone is generally greater than that of normal, and the little areas of osteoporosis visible at some places are not sufficiently marked to change the predominating picture, which is that of osteosclerosis. Frontal views are often valuable in demonstrating the loss of uniform density of this bone and in showing the irregularity in its thickness and the changes in its density. They also show the lateral extension of the hyperostosis and the tendency of the disease to spare the midsagittal line. A uniform thickening of the frontal bone has no diagnostic value.

Differential diagnosis in cases of this condition must take into consideration acromegaly, hemicraniosis, Paget's disease and leontiasis ossea. Osteoma of the vault does not offer great difficulty, since in this condition the outer table ordinarily is involved as well. In cases of acromegaly there is other roentgenographic evidence of the disease and the cranial hyperostoses do not follow the typical distribution found with frontal hyperostosis; furthermore, the inner and the outer table of the skull remain more or less parallel in cases of acromegaly. The differentiation of hemicraniosis depends on the thickening being confined to one half of the skull, usually with involvement of the orbital plate and the region around the gasserian ganglion. Cushing expressed the belief that this disorder was a secondary dystrophy dependent on the existence of a neoplasm of the arachnoid. Furthermore, in this condition there are a decrease in the orbital area and some downward protrusion of the orbital content, with loss of normal roentgenographic relations with the subjacent maxillary sinus; the frontal sinus on the affected side, as well as the sphenoid and ethmoid cells, shows increased density; there are an approximation of the anterior and the posterior clinoid processes and, finally, an increase in density of the superior part of the nasal fossa. There should, then, be little difficulty in differentiating these two conditions. Paget's disease shows a sufficiently typical picture, with alternating areas of osteoporosis and osteosclerosis, together with more widespread distribution and bony changes elsewhere in the body. Leontiasis ossea resembles Paget's disease far more than hyperostosis frontalis interna, and in this condition the bones of the face, particularly the superior maxilla, are involved.

NORCROSS, Toledo, Ohio. [ARCH. NEUROL. & PSYCHIAT.]

LESIONS OF THE CENTRAL AND PERIPHERAL NERVOUS SYSTEM FOLLOWING SULFAPYRIDINE THERAPY. H. PLUEGGE, Deutsche Ztschr. f. Nervenh. **151**:205, 1940.

Within the last few years, injuries to the nervous system caused by sulfanilamide have been observed. Neuritis, polyneuritis, myelitis and encephalomyelitis have been reported to be caused by this drug or its derivatives. Pluegge refers to the report in the German literature of a case of sciatica and to the report in the American literature of 2 cases of encephalomyelitis following sulfapyridine (2-[paraaminobenzenesulfonamido]-pyridine) medication. To these he adds 1 case of polyneuritis and 1 of neuromyelitis which occurred after treatment with this drug. The first patient, suffering from meningococcic meningitis, was given 21 Gm. of sulfapyridine in seven days, together with serum therapy. The spinal fluid became normal on the sixteenth day of the illness. On the tenth day there was a severe allergic reaction, and on the twenty-sixth day polyneuritis developed. This was restricted to the femoral, tibial and peroneal nerves. There were weakness and loss of reflexes in

the legs, but little or no sensory disturbance. The neuritis failed to improve with various forms of treatment. The second patient, also suffering from meningococcic meningitis, was treated with sulfapyridine. Six weeks after the onset, at which time the cerebrospinal fluid had returned to normal, weakness, ataxia and absence of the tendon reflexes in the legs were noted. Two weeks later urinary difficulties developed. All the neurologic signs were improving when the patient was seen last, three months after the onset of the complications.

ADLER, Boston. [ARCH. NEUROL. & PSYCHIAT.]

THREE CASES OF BRONCHOSTENOSIS. GERT VON SYDOW, Nord. med. **2**:1224 (April 22) 1939.

The first case was that of a girl 1½ years of age in whom bronchostenosis with emphysema of the left lung was demonstrated after an infection of the upper respiratory tract. The bronchostenosis did not produce the least deterioration of the girl's general state of health, although it had remained for at least five months. In the 2 other cases the bronchostenosis had been caused by tuberculosis of the bronchial glands.

WALLGREN, Göteborg, Sweden. [AM. J. DIS. CHILD.]

SURGICAL TREATMENT OF HARELIP AND CLEFT PALATE IN DENMARK. POUL FOGH ANDERSEN, Ugesk. f. læger **101**:1187 (Oct. 12) 1939.

In Denmark the surgical treatment of harelip and cleft palate has been centralized in a special hospital at Copenhagen and is carried out at the expense of the state. There is 1 instance of this malformation per 665 births, or an incidence of 1.5 per thousand. Of the children with this deformity, 9 per cent were stillborn and 12 per cent died within the first ten days of life. The author reports 372 cases. The operation for harelip is performed at the age of 2 months; in cases of bilateral harelip each side is operated on separately, with an interval of six to eight weeks between the operations. The operation for cleft palate is postponed until the age of 2 years. Light chloroform anesthesia is used. Of 235 patients operated on for harelip, 5 died, and 192 operated on for cleft palate, 2 died. Later the children attend courses in speaking given at the state institute for the correction of speech defects.

WALLGREN, Göteborg, Sweden. [AM. J. DIS. CHILD.]

OCULAR SYMPTOMS OF MALIGNANT TUMORS OF THE RHINOPHARYNX. E. GODTFREDSEN, Acta ophth. **18**:336, 1940.

Between 1931 and 1940, 64 patients with malignant tumors of the nasopharynx were observed at the radium station in Copenhagen, Denmark. Twenty showed ocular complications.

Characteristically, tumors in this region, which may be sarcoma, carcinoma or endothelioma, occur in relatively young persons. The deep cervical nodes may be involved by extension through the lymphatics while the tumor remains small. Compression of the cervical sympathetic nerve by these nodes may produce Horner's syndrome. Growth of the tumor upward through the foramen in the base of the skull may lead to involvement of any branch of the nerve supplying the eye. The 20 patients had fifty lesions of the ocular nerve.

In the author's series, roentgen therapy exerted favorable effects. In 1940, 7 patients were alive and had been free from symptoms for six months to seven years. Thirteen died in seven months to five years after the first appearance of symptoms. Of these, 6 had periods of transitory improvement varying from two months to three years.

O. P. PERKINS. [ARCH. OPHTH.]

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

ROBERT H. GOOD, M.D., *President*

WALTER H. THEOBALD, M.D., *Secretary*

Regular Monthly Meeting, April 7, 1941

Surgical Anatomy and Technic of the King Operation for Bilateral Paralysis of the Abductor Muscles of the Vocal Cords. DR. LINDON SEED. (From the Department of Surgery, University of Illinois College of Medicine, and the Cook County Postgraduate School.)

Dr. Seed discussed the operation presented by King in 1939 and expressed the belief that this is by far the most satisfactory procedure thus far devised for the treatment of bilateral paralysis of the abductor muscles of the vocal cords. Heretofore, most patients with this condition have been subjected to permanent tracheotomy. His paper was designed primarily to illustrate the anatomic landmarks and to describe the operative technic. The slides which accompanied the presentation were made from drawings of dissected portions fresh and preserved cadavers and from recently removed larynxes and showed the technic of operation in detail.

The operation is basically arthrodesis of the arytenoid joint with the arytenoid cartilage fixed in abduction and external rotation. Although the procedure is not formidable, it must be carried out meticulously. King has admonished that no one should undertake the operation without first acquiring an accurate knowledge of the anatomy involved and has suggested that this knowledge be acquired by work in an anatomic laboratory.

Prior to the scientific program several patients were presented.

DISCUSSION OF A PATIENT PRESENTED

DR. E. SASSON: The patient shown presents one of the rather rare forms of Riedel's struma. She complained of dysphonia and of choking at meals. Six months before she came for examination her neck had begun to swell. Two weeks later she entered the hospital with urgent dyspnea requiring tracheotomy. The left vocal cord was fixed and pushed toward the right. The whole larynx was infiltrated, and the glottic chink was very narrow. Over the thyroid gland there was a smooth, very hard swelling, which was slightly tender and was fixed to the surrounding deep structures but not to the skin. The regional lymph nodes did not seem to be involved.

Two histologic types of chronic thyroiditis are described: (1) Riedel's struma, which is characterized by much fibrosis with considerable hyaline degeneration; (2) Hashimoto's "struma lymphomatosa," in which there is marked infiltration with lymphocytes. There has been considerable controversy concerning their relationship. The fact that the slides in this case show both types suggests that there is no essential difference in the underlying pathologic condition.

The patient has had fractionated doses of roentgen radiation to a total of 4,080 roentgens and now has a fair voice and a normal airway, although considerable swelling of the thyroid gland is still present. For several months she has had no trouble without a tracheotomy tube, and she seems to be nearly recovered.

Modified Kelly Operation for Bilateral Paralysis of the Abductor Muscles. Dr. T. C. Galloway.

Since postoperative bilateral paralysis of the abductor muscles is such a distressing condition, it is fortunate that at last real progress has been made in its treatment. The Hoover and Love operations were fairly satisfactory, and the procedure of King is a real advance. Kelly's idea of an approach through the thyroid cartilage seems to simplify the technic greatly.

The patient I presented had the King operation on the right side seventeen months ago and a modified Kelly operation on the left side seven months ago, and offers a good comparison of the two. During the King operation, which was performed with the region under local anesthesia, the omohyoid muscle was seen to contract on deep inspiration. For several weeks afterward the arytenoid cartilage, to which it was attached, did the same, but there was no movement on ordinary breathing, though the position was fair. After a few months the condition was only a little better than before operation.

On the other side the Kelly approach was used with two modifications: 1. A direct laryngoscope was inserted under the epiglottis, and then, with the field under vision through the window in the thyroid cartilage, the arytenoid cartilage was easily picked up by a sharp hook. This seemed important, since the position of this muscle, as recently pointed out, varies considerably, especially in the two sexes, and it may not be easy to locate.

2. The arytenoid cartilage was left in, as it seemed that its attachment to the cord through the vocal process made possible much better traction laterally.

The operation was done as follows: (1) A Kocher incision was made; (2) the perichondrium was elevated; (3) a round window was made with a curet and a biting forceps; (4) the arytenoid cartilage was grasped through its muscular process by a hook guided under vision through a laryngoscope; (5) the cricoarytenoid joint was mobilized; (6) the cricoid was transfixed anteromedial to its center of rotation, drawn laterally into the space of the window in the thyroid cartilage and fixed to the thyrohyoid muscle and the external perichondrium. The result seems excellent. The patient has a fair voice and a quite adequate airway, and the vocal cord is holding the position it had after operation.

Dr. Seed's demonstration of the mechanics of the movements of the arytenoid cartilage seems important. Probably a good many operative failures have been due to disregard of the point of fixation through the arytenoid cartilage.

When a patient has much dyspnea, a tracheotomy should always be done to prevent cardiac collapse under prolonged strain or acute emergency, as well as to prepare for later operative relief.

DISCUSSION

Dr. Warren Cole: I am not qualified to discuss this paper on any ground except that I have followed King's work closely and am convinced that there is real merit in his operation. With Dr. Holinger I performed the King operation on a patient. However, my attempt to use it was a failure, as I shall explain later.

I do not believe that transplantation of the omohyoid muscle is an important part of the operation, and Dr. Galloway's observations convince me that it is not important. Dr. Seed has illustrated the important point that the suture must be properly placed; if this is placed far posteriorly on the muscular attachment, the pull on the fulcrum will be wrong, and widening of the space between the cords will be minimal. Under these conditions I should expect this space to decrease as time passes and perhaps to be insufficient.

Of the two procedures, I think the King operation is superior to the Kelly. The one advantage of the Kelly operation is that some substance, the arytenoid cartilage, is removed, thereby making room; the consequent atrophy of muscles would also tend to increase the size of the airway. But in the Kelly operation there is danger of perforation through the mucosa, with the result that infection occurs and perhaps abscess formation. I think Dr. Galloway's procedure is a

splendid contribution, and I believe it will be used, at least in part. The great advantage is that it is quite simple, and with the window cut in the thyroid cartilage the operator does not have to stand on his head to get exposure of the cartilage. However, it seems likely that there are fewer landmarks and that one might have difficulty in getting one's bearings, particularly since the arytenoid cartilage is not always in a constant position, as brought out previously by Dr. Lederer.

The woman on whom Dr. Holinger and I operated was about 65 years of age and had had paralysis of the vocal cords for seven or eight years. When she came for treatment there was complete respiratory block. At operation we obtained a fairly good exposure of the cartilage and disarticulated it satisfactorily. The cartilage was extremely brittle and fractured when the suture was placed. We replaced the suture, and after it was tied, laryngoscopic examination revealed a good airway. Something happened later to reverse the whole picture, for within a few hours the patient had almost a complete block. I am certain that the suture either broke or pulled out, perhaps because of another fracture of the cartilage. I should therefore like to issue a caution in regard to the treatment of elderly patients. One must be careful about putting the suture in. In King's publication he also told about breaking two or three cartilages. Naturally, the tendency toward calcification is greater in elderly people. It might be advisable to dissect the cartilage loose so that a suture may be placed around rather than through it.

Dr. Alfred Lewy: Perhaps I should apologize for passing an opinion on an operation I have never seen. Recently, there has come to my attention an operation by Krainz, of Innsbruck, Austria, for bilateral paralysis of the abductor muscles with median position of the cords. His operation is done under suspension laryngoscopy and consists essentially in submucous elevation of the anterior and posterior mucosal walls of the interarytenoid region and the removal of the arytaenoideus obliquus and transversus muscles with a Patterson punch. At the 1939 meeting of the German Society of Otolaryngologists Krainz reported the cases of 4 patients. Each patient was wearing an intratracheal tube, which could be dispensed with after the operation. He claimed that each also had a very good voice. This he attributed to the tensor action of the cricothyroid muscle, which is supplied by the superior laryngeal nerve and is not involved in the paralysis of the recurrent nerve. In complete bilateral paralysis of the recurrent nerve the vocal cords are in the cadaveric position. The median position, according to Krainz, is due to contracture of the arytaenoideus obliquus and transversus muscles. I mention this operation because it is simpler than any other that has been advocated so far. I have had no opportunity to perform it myself.

A school teacher who had bilateral paralysis with median position of the cords was faced with the dilemma of choking to death or of losing her job and starving to death if she lost her voice. I put in a Gordon New check valve intratracheal tube, which enables her both to breathe and to speak so well that she has been working for over a year without her colleagues' discovering that she is wearing the tube. She refused operation for a long time, until an infection of the upper respiratory tract brought about an acute obstruction which required temporary intubation.

Dr. Lindon Seed: About a month ago I had a discussion with Dr. King. Although in his original paper he emphasized the attachment of the omohyoid muscle to the muscular process of the arytenoid cartilage, in his second paper he said definitely that the vocal cord, to which the omohyoid muscle is attached, does not move at all. In all the patients he has seen the vocal cord is absolutely fixed. At autopsy on a patient in whom transposition of the omohyoid muscle had been performed and who died later, he noticed that there was some widening of the vocal slit, produced by pulling on the transposed omohyoid muscle.

I do not believe that Dr. Galloway has modified the Kelly operation. He has modified the King operation. What he has done is to rotate the vocal process

of the arytenoid cartilage in an outward direction and to hold it in that position with string. Dr. Galloway's approach through the thyroid plate seems more simple, and I believe it can be performed more easily. Dr. King found that in some cases he could facilitate the operative procedure by taking a lateral bite out of the thyroid plate, thus giving more room.

As to the benefit to be derived from the simple severance of the interarytaenoideus muscles, I can say only that the severance of these muscles in cadavers produces no widening of the vocal slit. Widening depends almost entirely on rotation of the arytenoid cartilage.

In recurrent laryngeal nerve paralysis the interarytaenoideus muscles are paralyzed and they should not cause more adduction. However, if the removal of these muscles has produced successful results in 4 cases, one cannot lightly cast this operation aside, although theoretically it may seem relatively inefficient.

Scarlet Fever, Bilateral Mastoiditis with Intervening Pneumonia, and Cerebellar Abscess with Recovery. DR. ROBERT B. LEWY.

A case was reported, that of a boy aged 4 years, who was admitted to the Municipal Contagious Disease Hospital with a diagnosis of scarlet fever. The long and stormy course from Aug. 26, 1940 to Jan. 11, 1941, was described in detail, and the author discussed the complications which arose and the measures used in combating each.

The conduct of the case was of particular interest because throughout the course important decisions had to be made, and not infrequently there was disagreement among the clinicians as to what should be done, when it should be done and how it should be done.

The first decision to be made was whether, since mastoidectomy was definitely indicated for the left ear and the right ear had discharged less than two-thirds as long, an operation should be performed on this ear as well. The decision was finally made to operate on the left ear and to judge by the conditions seen there whether the right ear should be operated on. The pathologic condition found was adequate to justify operation on the left mastoid but did not indicate that the inflamed mastoid bone on the right side was adequately necrosed or the process sufficiently localized to justify surgical treatment.

The second decision to be faced was to establish the cause of a continued elevation of temperature after the first operation. There were two possible causes, either or both of which could have been responsible—pneumonia and continued mastoiditis on the right side.

The third decision was whether the right mastoid was responsible for continuance of the pneumonic process and should be operated on or, as the pediatrician held, surgical treatment of the right mastoid would further lower the patient's resistance. Finally, a mastoidectomy was performed on the right side, with the region under local anesthesia. The result was favorable until the development of a cerebellar abscess on the left side.

The fourth matter requiring decision was when to operate on the cerebellar abscess. Because of the comatose condition of the patient, an operation was performed on the same day that the diagnosis was established.

The fifth decision involved the recommendation of the neurologist, who felt that trephining should be performed on the side opposite the abscess, for draining the ventricle, and that a suboccipital approach should be made into the abscess. Instead of this, the mastoid opening was enlarged to uncover the dura over the posterior fossa, and the abscess was drained directly from this area.

The sixth decision was an easy one. It concerned the question of the use of sulfanilamide after a diagnosis of cerebellar abscess had been made. The reasoning here was simple. It was felt that there was everything to gain and nothing to lose by the use of the drug. Since it is characteristic of an abscess to have a very vascular wall, it could be expected that large quantities of sulfanilamide

would deposit in this region and might prevent progress while there was a chance that nature might heal the lesion. With this idea in view, 140 grains (8.4 Gm.) were given per day.

DISCUSSION

DR. SAMUEL SALINGER: It is certainly pleasant to hear about a patient with abscess of the brain who recovered, and congratulations are due Dr. Lewy and his consultants on the happy result. I often wonder, when I encounter or read of cases such as this, who has the more headache, the patient or the doctor, because I have experienced this sort of thing and know all about the discussions and arguments that take place.

Dr. Lewy poses a number of questions which I believe merit some comment. With one or two exceptions I agree with him as to the logic of his procedures. The first point that I think debatable pertains to the performing of a bilateral mastoidectomy on a patient with scarlet fever when both ears are discharging. I am in favor of waiting until one is reasonably sure that the process is extending to the point where it is not likely that resolution will take place spontaneously. I much prefer to operate on the two sides at the same time, in order to see the degree of the pathologic involvement and to be sure that the foci have been eliminated. Dr. Lewy stated that he proposed to judge by the severity of the pathologic condition present on one side how far the process had gone on the other. I do not believe this is a safe criterion. In the first place, the ears began to discharge at different periods, indicating different degrees of local and constitutional resistance, and it is entirely possible that the disease process might have progressed more rapidly in the second ear than in the first, since the second ear became involved at a time when the patient's resistance was lower than at the beginning of his illness. In the second place, without knowing definitely the degree of involvement present in the ear not operated on, Dr. Lewy was forced into the dilemma of having to decide whether the cause lay in the ear not operated on or beyond the surgical field of the side operated on. The decision would have been much easier had both mastoids been opened at the same time.

As to the question of opening an abscess of the brain through a clean area or approaching it by way of the original operative field, I am afraid that the subject is still controversial. The best results I have seen have come from opening the abscess through the original operative field.

Concerning the use of sulfanilamide after the abscess had been opened, I agree that no harm could come from using it in the hope of combating bacterial activity in the capsule of the abscess and in the adjacent vascular bed. However, I think that the effectiveness of the remedy would be greatly enhanced if the drug were used locally as well as internally. General surgeons have found the local use of sulfanilamide and its derivatives extremely valuable in the treatment of large infected spaces and advocate the administration of one or another of these drugs by irrigation, instillation of a heavy suspension of the drug or packing the infected region with the pure powder. It seems to me that if sulfanilamide is safe to use in the peritoneal cavity, it should be equally safe for the treatment of abscess of the brain.

DR. ARCHIBALD L. HOYNE: We at the hospital felt that this was a very remarkable piece of work which Dr. Lewy accomplished. Concerning sulfanilamide, we are not particularly enthusiastic in regard to its use in the treatment of scarlet fever. We have been trying it locally for some patients who have had aural discharge, and we have been giving it orally sometimes, to see whether our results were as favorable as those claimed by many. There has been a great deal of doubt as to the benefit. Some of us thought the drug was very helpful, while others did not.

There is one point that has not been emphasized particularly. That is the time at which the complications developed in Dr. Lewy's patient. The child was in the hospital with what might be considered an average attack of scarlet fever. He was progressing very favorably. At the beginning of the fourth week trouble

developed, first in one ear, then in the other. This happens frequently in mild attacks of scarlet fever. After the patient has practically recovered, complications may come on which can terminate fatally. The aural complications of scarlet fever are often serious. I think Dr. Lewy is to be congratulated on his excellent management of the case reported.

DR. L. J. HUGHES: Did the child have sulfanilamide therapy prior to the onset of the aural complications? If so, does Dr. Lewy think the drug had something to do with deferring the onset of otitis media?

DR. ROBERT B. LEWY: This child received no sulfanilamide prior to the time the ears began to discharge but did receive some after the ears began to discharge. I was not in attendance on the patient, or the drug would not have been given. I feel that sulfanilamide masks the picture, and there are enough intangible questions in these cases.

With reference to Dr. Salinger's discussion, I think it is interesting to look at the history of mastoidectomy in this country in the last thirty-five years. Many of you will remember that twenty-five or thirty years ago diseased mastoids were operated on in the hemorrhagic stage, and that is still recommended in some textbooks. You will also recollect that there was a far higher incidence of intracranial complications than there is today. I cannot say for sure that these observations are related, but the reason that many intracranial complications started might be that mastoid operations were performed before there was ample time for localization.

The case which has been described might argue against that. Nevertheless, I believe there is a distinct correlation. I always hesitate to operate on any mastoid area unless there are danger signs. In this case the disease process in one mastoid had gone so far that we felt it was dangerous, and we felt that it was hazardous to operate on the other mastoid. For that reason we operated on one at a time.

About the use of sulfanilamide by irrigation: I have read about the use of the drug by irrigation in cases of compound fracture, but I have not been convinced that the sulfanilamide rather than good care brought about the results. If a suspension of sulfanilamide is used for irrigation, the drug comes up against a surface, whereas if it is in the blood stream, it will prevent further infection.

Directory of Otolaryngologic Societies *

NATIONAL

American Medical Association, Scientific Assembly, Section on Laryngology, Otology and Rhinology

Chairman: Dr. Gordon F. Harkness, 215 Main St., Davenport, Iowa.
Secretary: Dr. Louis H. Clerf, 1530 Locust St., Philadelphia.
Place: Atlantic City. Time: June 8-12, 1942.

American Academy of Ophthalmology and Otolaryngology

President: Dr. Frank R. Spencer, Physicians' Bldg., Boulder, Colo.
President-Elect: Dr. Ralph I. Lloyd, 14-8th Ave., Brooklyn.
Executive Secretary: Dr. William P. Wherry, 1500 Medical Arts Bldg., Omaha.
Place: San Francisco. Time: Oct. 11-15, 1942.

American Broncho-Esophagological Association

President: Dr. W. Likely Simpson, 899 Madison Ave., Memphis, Tenn.
Secretary: Dr. Paul Holinger, 700 N. Michigan Ave., Chicago.

American Laryngological Association

President: Dr. T. E. Carmody, 227-16th St., Denver, Colo.
Secretary: Dr. Charles J. Imperatori, 108 E. 38th St., New York.
Place: Atlantic City, N. J. Time: May 25-27, 1942.

American Laryngological, Rhinological and Otological Society, Inc.

President: Dr. James A. Babbitt, 1912 Spruce St., Philadelphia.
President-Elect: Dr. James G. Dwyer, 375 Park Ave., New York.
Secretary: Dr. C. Stewart Nash, 708 Medical Arts Bldg., Rochester, N. Y.
Place: Atlantic City, N. J. Time: June 1-3, 1942.

SECTIONS:

Eastern.—Chairman: Dr. Henry P. Johnson, 32 Deering St., Portland, Maine.
Place: Portland, Maine. Time: Jan. 15, 1942.

Southern.—Chairman: Dr. William L. McDougall, 915 Doctors' Bldg., Atlanta, Ga.
Place: Atlanta, Ga. Time: Jan. 23, 1942.

Middle.—Chairman: Dr. William E. Sauer, 3720 Washington Blvd., St. Louis, Mo.
Place: St. Louis. Time: Jan. 21, 1942.

Western.—Chairman: Dr. Emil F. Tholen, 1136 W. 6th St., Los Angeles.
Place: Los Angeles, Calif. Time: Jan. 31-Feb. 1, 1942.

American Otological Society

President: Dr E. M. Seydell, 107 W. Douglas Ave., Wichita, Kan.
Secretary: Dr. Isidore Friesner, 101 E. 73d St., New York.
Place: Atlantic City, N. J. Time: May 28-29, 1942.

* Secretaries of societies are requested to furnish the information necessary to keep this list up to date.

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